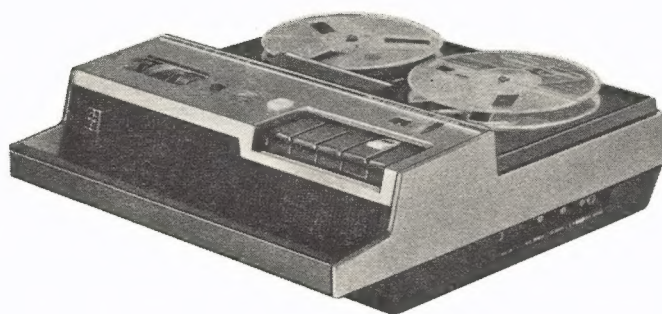


# NATIONAL

## TAPE RECORDER SERVICE MANUAL



### MODEL RQ-158S

#### AUTOMATIC REVERSE AND VOICE OPERATION TAPE RECORDER

#### CONTENTS

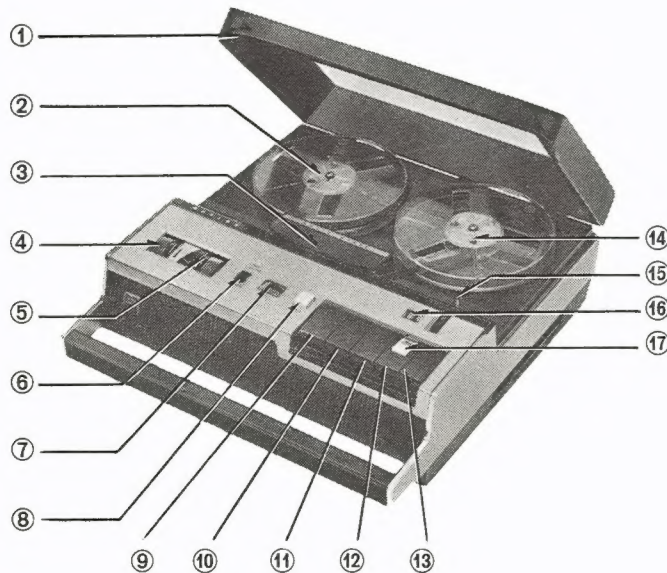
SPECIFICATIONS .....	1
PARTS LOCATION .....	1
BLOCK DIAGRAM OF ELECTRICAL CIRCUITS .....	2
DISASSEMBLY INSTRUCTION .....	3
MECHANICAL OPERATING CONTROLS.....	4
MECHANICAL ADJUSTMENTS .....	7
AMPLIFIER ADJUSTMENTS .....	8
REPLACEMENT PARTS LIST .....	10
TROUBLE SHOOTING GUIDE .....	14
EXPLODED VIEWS .....	18
EXPLANATIONS ON CIRCUITS .....	22
CIRCUIT BOARD .....	25
WIRING CONNECTION DIAGRAM .....	27
SCHEMATIC CIRCUIT DIAGRAM .....	28
ELECTRICAL PARTS LOCATION .....	29
CABINET PARTS .....	29
ACCESSORIES .....	31
COMPONENT PACKING .....	32

**MATSUSHITA ELECTRIC**

## SPECIFICATIONS

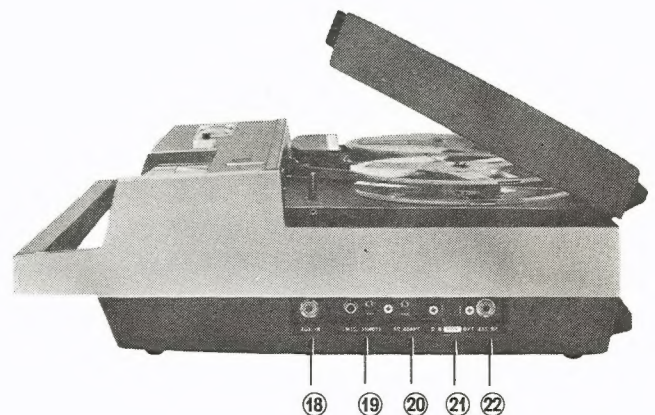
Power Source:	Battery: 9 V (6 "D" size Batteries)
Audio Output:	1.2 W (1.5 W maximum)
Transistors:	2SB 173(1) 2SB 175(4) 2SB 176(1) 2SB 324(2) 2SB 172(1)
Recording System:	AC. Bias 35K Cycles
Erasure System:	DC. Erase
Track System:	Automatic Reverse 2 Track System
Monitor System:	Sound Monitor
Tape Speeds:	3-3/4 ips. and 1-7/8 ips.
Frequency Response:	120~8,000 c/s at 3-3/4 ips. 120~5,000 c/s at 1-7/8 ips.
Input Impedance:	Microphone 8 K $\Omega$ Auxiliary 80 K $\Omega$ AC. Adaptor 9V
Output Impedance:	Extension Speaker Jack "EXT.SP" 8 $\Omega$
Playing Time:	1 hour at 3-3/4 ips. with 5" Tape (600 ft) 2 hours at 1-7/8 ips. with 5" Tape (600 ft)
Battery Life:	More than 15 hours (using NATIONAL "Hi-Top" Batteries)
Recording Level Indicator:	VU. Meter
Built-in Speaker:	6" $\times$ 3-1/4" Dynamic Speaker
Dimensions:	11-3/4"(W) $\times$ 13"(D) $\times$ 3-3/8"(H)
Weight:	About 10 lbs. without Batteries

## PARTS LOCATION



- ① Case Lid
- ② Left Reel Table
- ③ Head Cover
- ④ Volume Control Knob
- ⑤ Tone Control Knob
- ⑥ Voice Operation Switch
- ⑦ Level Indicator
- ⑧ "CUE" (Instant Stop) Button
- ⑨ Rewind Push Button
- ⑩ Stop Push Button
- ⑪ Fast Forward Push Button
- ⑫ Play Push Button
- ⑬ Record Push Button
- ⑭ Right Reel Table
- ⑮ Capstan Sleeve Rest
- ⑯ Tape Counter
- ⑰ Reverse Push Button

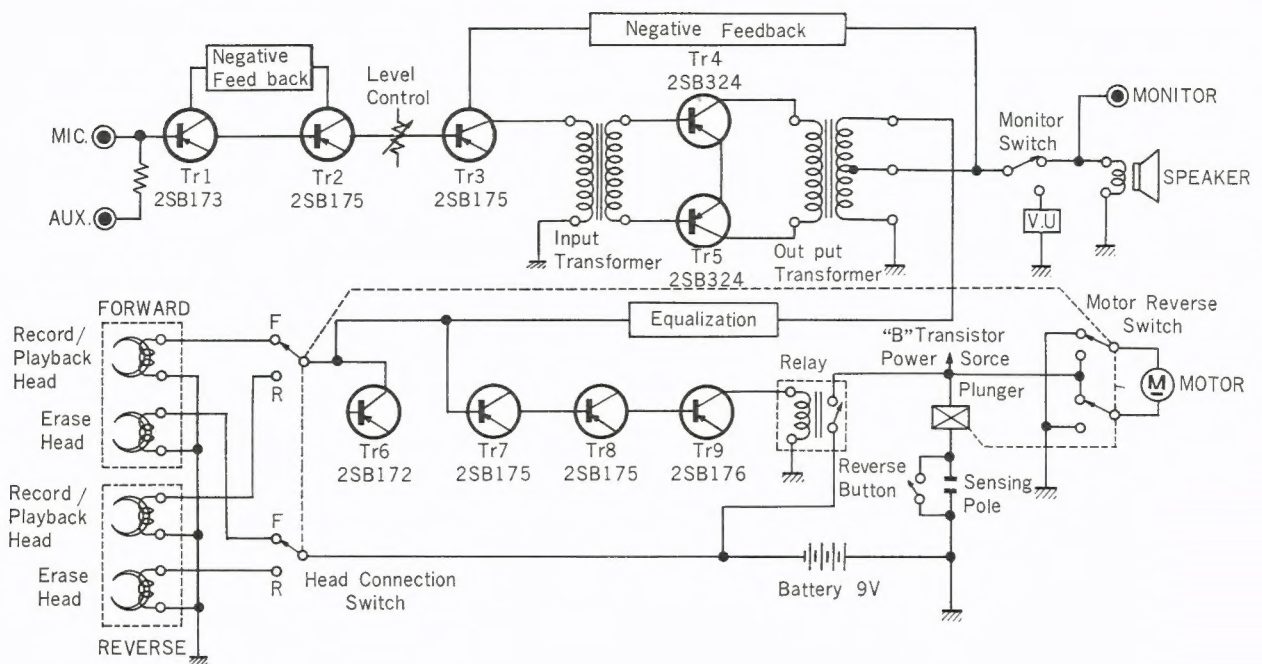
- ⑱ Auxiliary Input Jack
- ⑲ Microphone and Remote Control Jack
- ⑳ AC. Adaptor Jack
- ㉑ Sound Monitor Switch
- ㉒ Earphone and EXT. SP. Jack



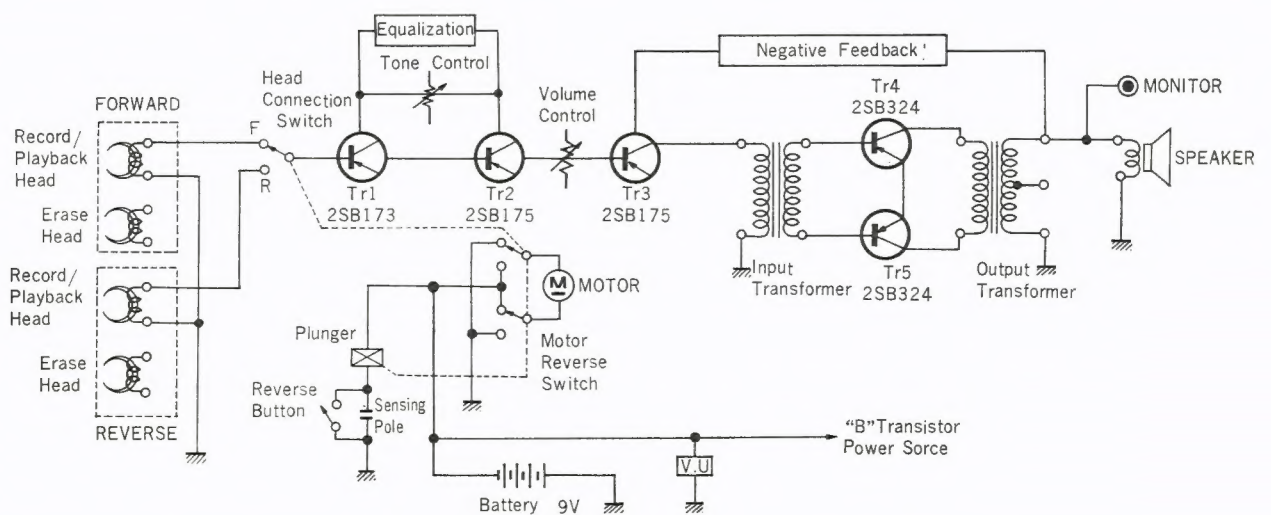


# BLOCK DIAGRAM OF ELECTRICAL CIRCUITS

## RECORDING CIRCUIT

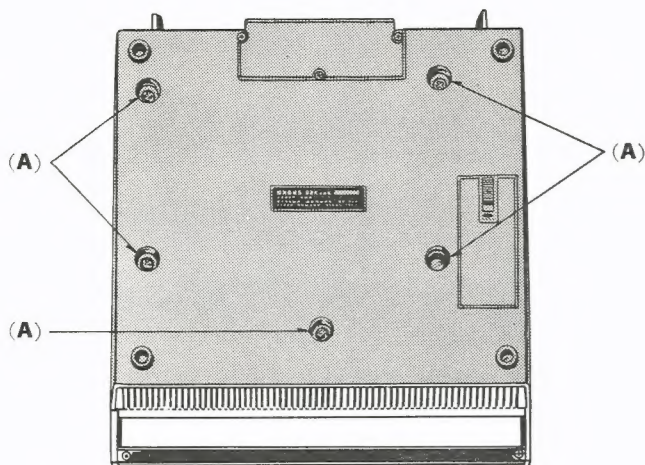


## PLAYBACK CIRCUIT



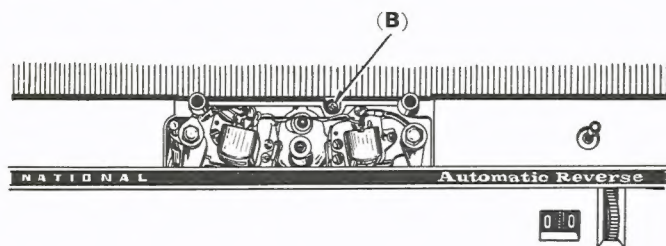
# DISASSEMBLY INSTRUCTIONS

## BOTTOM COVER

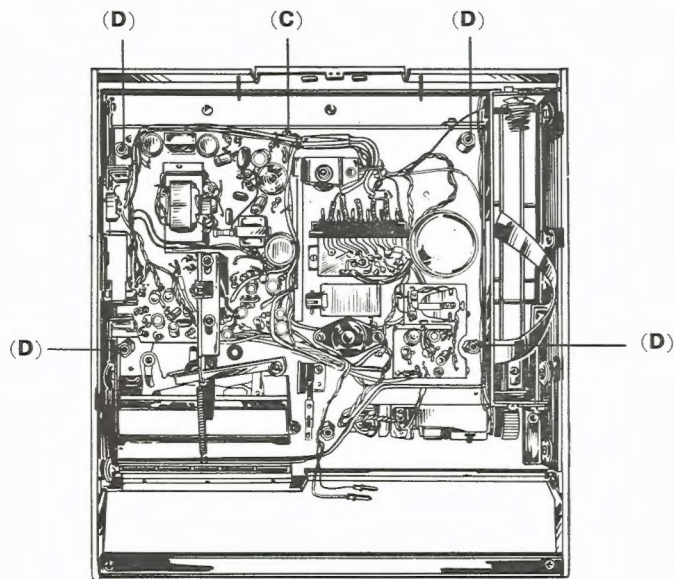


1. Turn over the Main Cabinet Body.
2. Remove 5 screws (A) holding Bottom Cover.
3. Pull out Speaker lead wires.

## MAIN CABINET BODY CASE

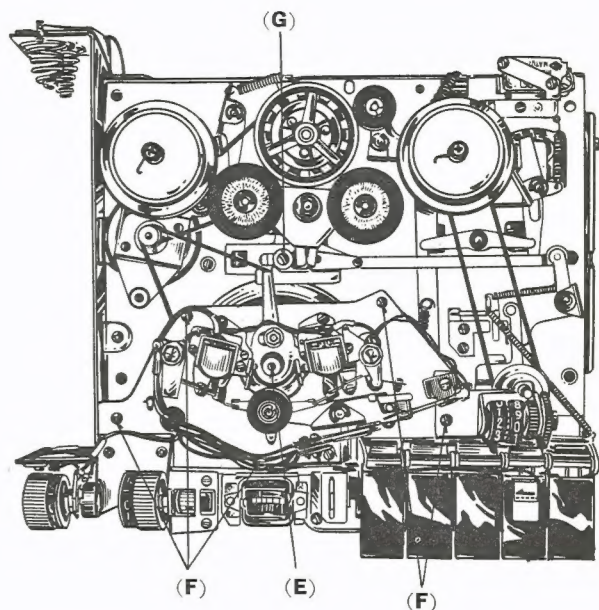


1. Remove Head Cover.
2. Remove screw (B) under the Head Cover.
3. Remove Bottom Cover.  
(Refer to Bottom Cover)



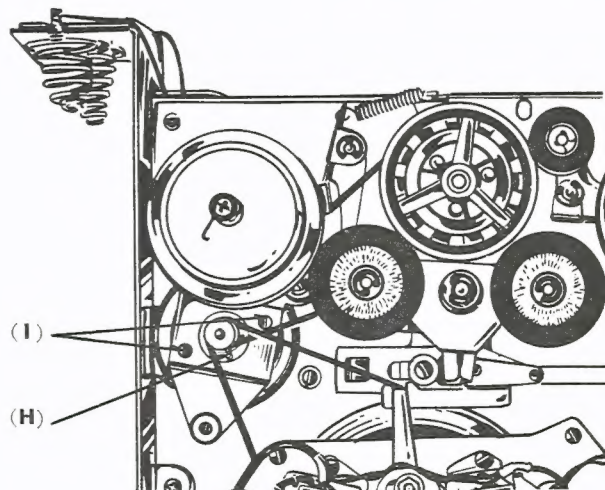
4. Remove 5 Chassis Mounting Screws (C) and (D).

## FLYWHEEL



1. Remove Capstan Sleeve (E) from Capstan.
2. Unscrew and remove screws (F) from the Upper Baseplate, and remove Baseplate.
3. Unscrew and remove screw (G) from the Slide Switch Rod and move the Rod toward the Reel Table.
4. Carefully remove the Flywheel. In this instance, care must be taken not lose the Thrust Steel Ball put in the Flywheel Shaft Bearing.

## MOTOR



1. Loosen screw (H) and remove Motor Pulley.
2. Unscrew and remove screws (I) and remove Motor.



# MECHANICAL OPERATING CONTROLS

## OPERATION

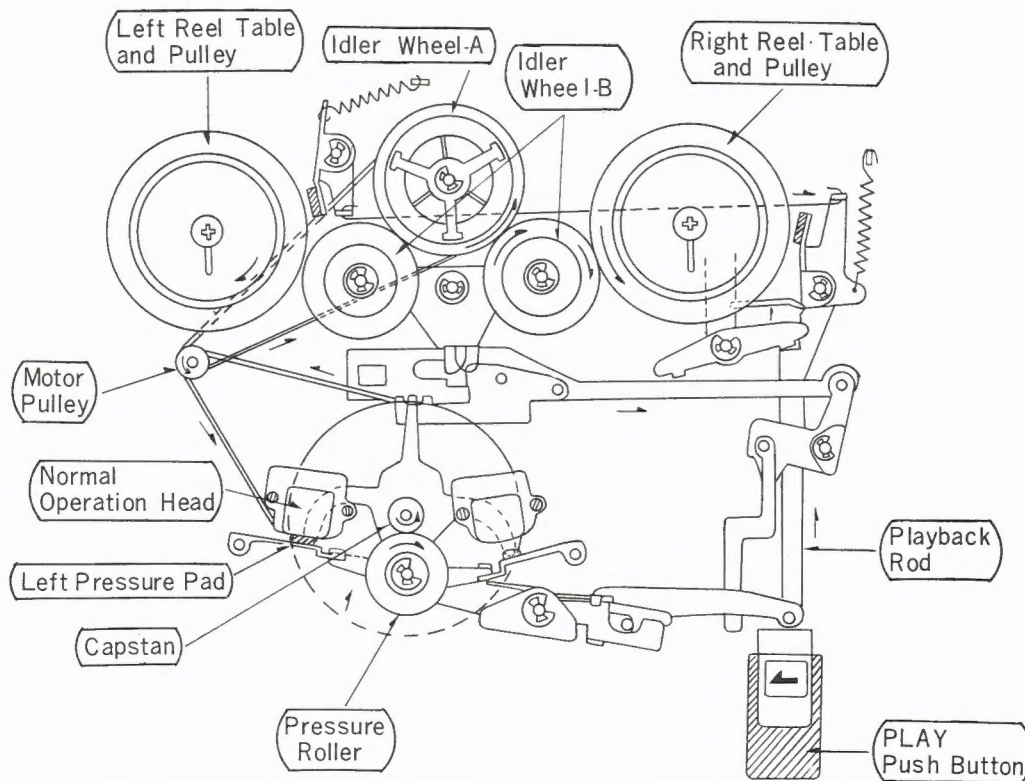
1. Set to required speed by inserting Capstan Sleeve or removing it from Capstan.
2. When "PLAY" Push Button is pressed, the unit is set at "PLAY" mode.
3. When "PLAY" and "RECORD" Push Buttons are pressed simultaneously, the unit is set at "RECORD" mode.
4. When "REWIND" Push Button is pressed, the tape just recorded or played back is rewound rapidly.
5. When "FAST FORWARD" Push Button is pressed, the tape is advanced rapidly.
6. When "CUE" Push Button is pressed, the tape motion stops instantly for cueing and editing purposes.
7. When "REVERSE" Push Button is pressed together with the "PLAY" Push Button, or while the tape is moving in normal forward direction, the tape moves in reverse direction, or the tape direction reverses instantly.

## TAPE TRANSPORT CONTROL FUNCTIONS

1. The Buttons are released automatically, when the other Buttons are pressed, except "CUE" Push Button.
2. The "CUE" Push Button is inoperative when unit is set at "FAST FORWARD" or "REWIND" mode.

## TAPE TRANSPORT OPERATION

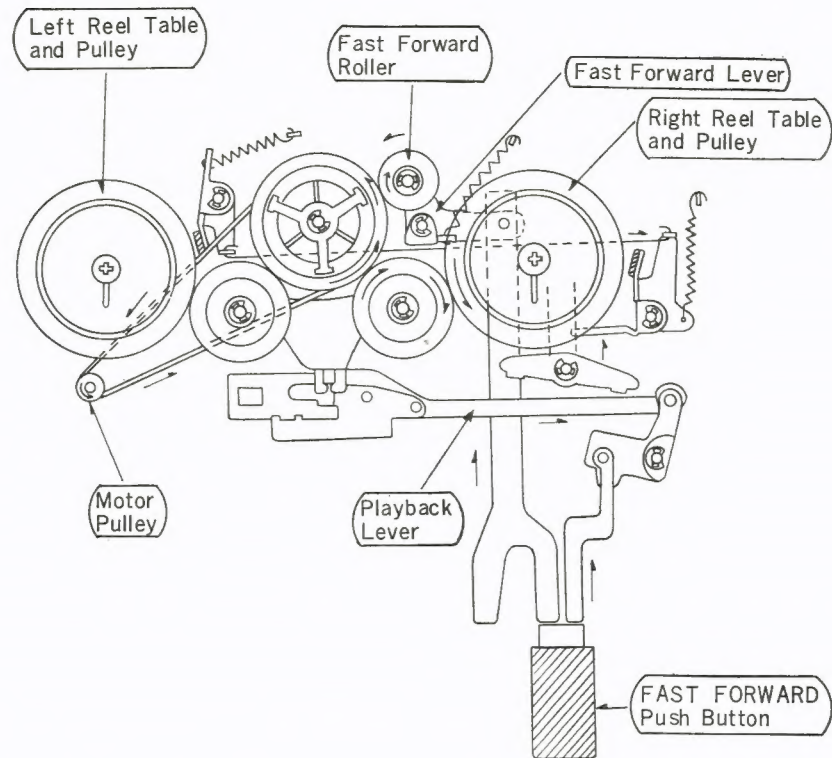
### PLAYBACK AND RECORD



When "PLAY" Push Button is depressed, Pressure Roller is pressed against Capstan and the left side Pressure Pad assembly is pressed against Head. At the same time, Idler Wheel-B contacts Idler Wheel-A, Right Reel Table and Pulley simultaneously causing Right Reel Table to rotate.

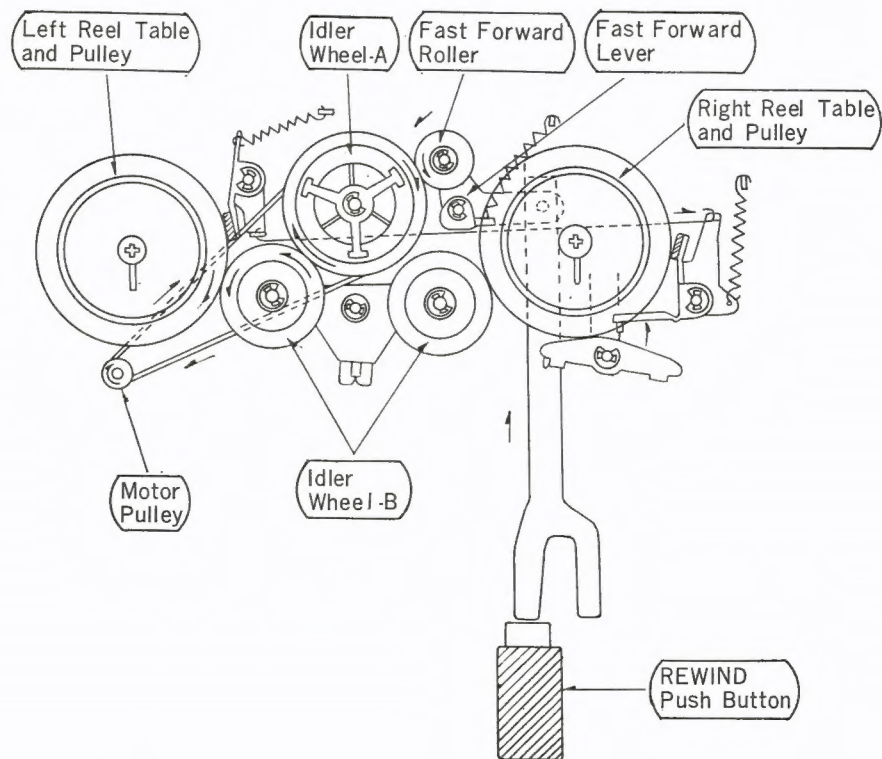
When "PLAY" and "RECORD" Push Buttons are depressed simultaneously, the unit is in the "RECORD" mode, with the mechanism set in the same manner as in the "PLAY" mode.

## FAST FORWARD



When "Fast Forward" Push Button is depressed, Fast Forward Roller contacts against Idler Wheel-A. At the same time, Idler Wheel-B contacts against Right Reel Table, Idler Wheel-A and Right Reel Pulley simultaneously causing Right Reel Table to rotate rapidly.

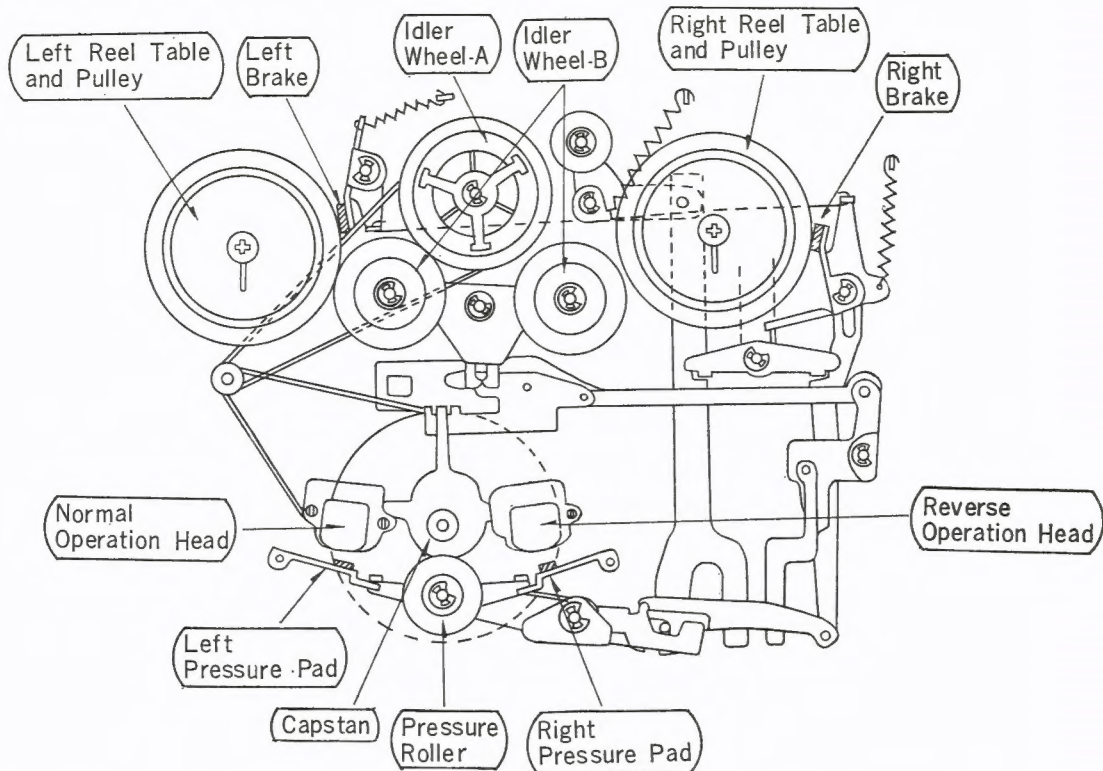
## REWIND



When "REWIND" Push Button is depressed, Fast Forward Roller contacts against Idler Wheel-A and Idler Wheel-B contacts against Left Reel Table causing Left Reel Table to rotate rapidly.

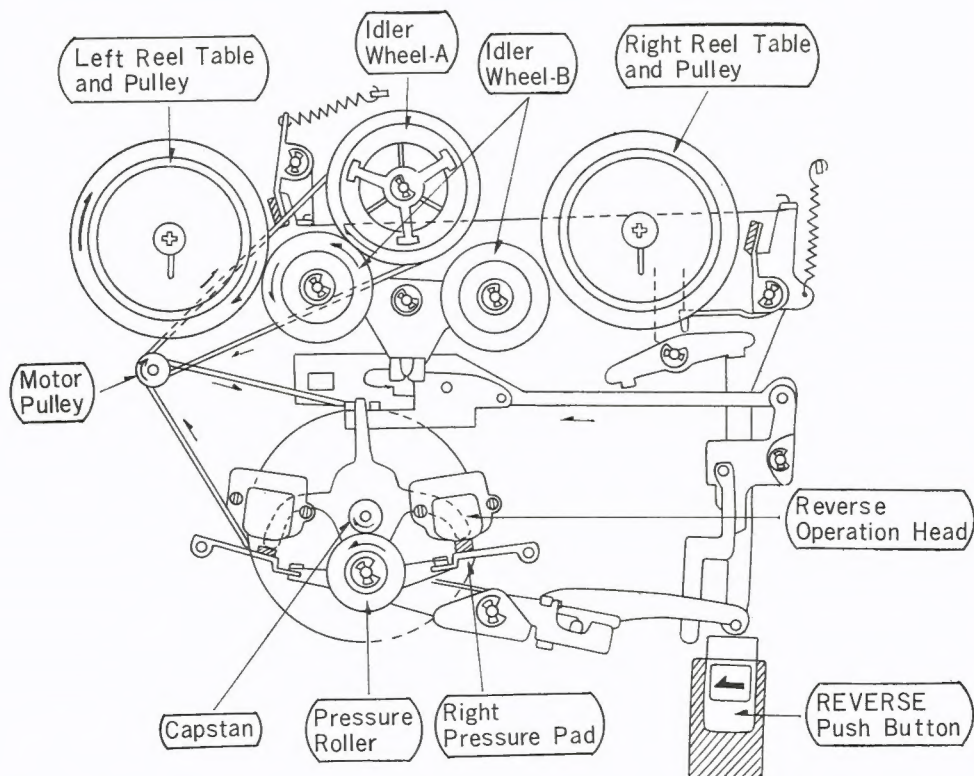


## STOP



When "STOP" Push Button is depressed, previously engaged Push Button is instantly released. Brakes will stop both Reel Tables and power supply to the unit is cut-off.

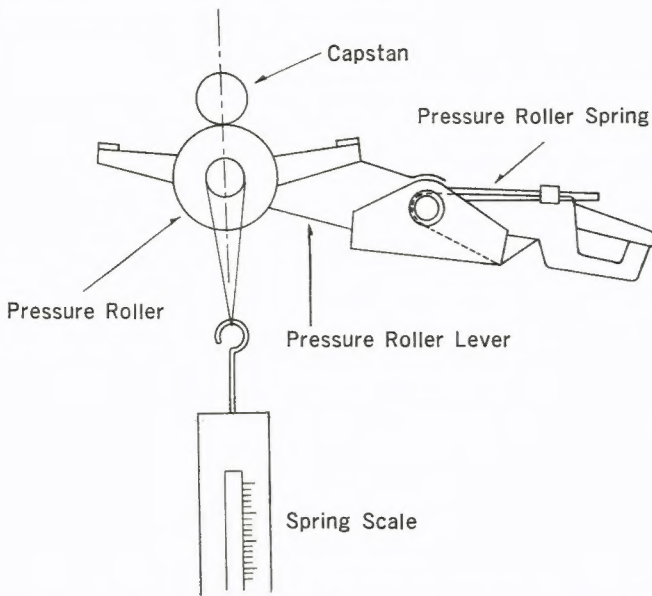
## REVERSE



When "REVERSE" Push Button is pressed or the Auto-Reverse Mechanism is activated by means of contact of the metal sensing foil attached to the tape against tape guide post while unit is in "RECORD" or "PLAY" mode of normal forward direction, Idler Wheel-B contacts against Left Reel Table and Idler Wheel-A. Simultaneously, right side pressure Pad assembly Presses against Head.

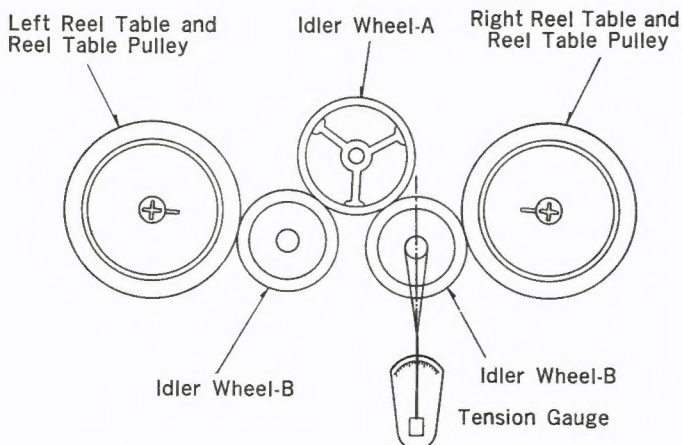
# MECHANICAL ADJUSTMENTS

## PRESSURE ROLLER TENSION



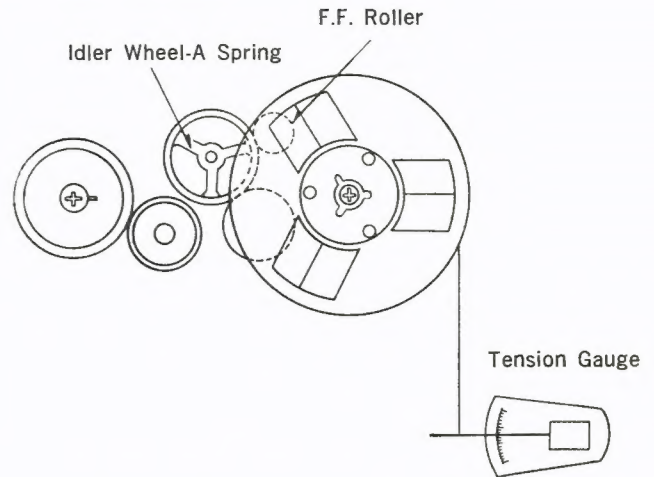
1. Shaft of Pressure Roller must be parallel to shaft of Capstan.
2. Pressure between Capstan and Pressure Roller can be checked as follows:
  - a. Set the recorder in PLAY mode with speed set at 1-7/8 ips.
  - b. Hook a loop of thread at Pressure Roller Shaft and Spring Scale and pull until Pressure Roller is disengaged from Capstan.
  - c. The proper pressure is between 7~12.4 ozs. (200~350 g).
  - d. If pressure is not within the above range, adjust Pressure Roller Spring.

## IDLER TENSION



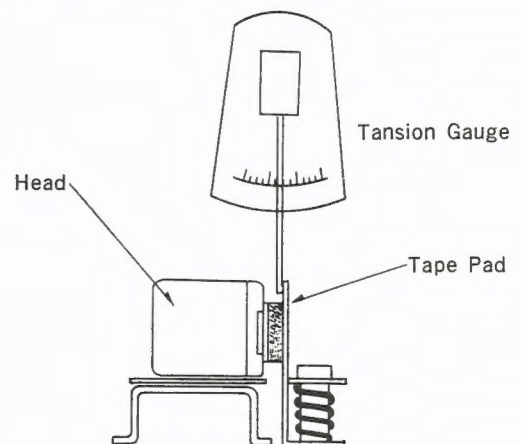
1. Shaft of Idler Wheel-B must be parallel to shafts of Idler Wheel-A and Reel Table Pulley.
2. Pressure between Idler Wheel-B and Idler Wheel-A and Reel Table Pulley can be checked as follows:
  - a. Set the recorder in PLAY mode.
  - b. Hook a loop of thread as follows and pull until Idler is disengaged from the Idler Wheel-A (conduct for both Idler Wheels).
  - c. The proper pressure is between 1.4~2.5 ozs. (40~70 g).

## WINDING TORQUE



1. Place a 5 inch tape reel on either the right or left reel table and hang the end of the tape on a Tension Gauge.
2. Proper tensions are as follows:
  - a. PLAY mode.....more than 0.176 ozs. (5 g)
  - b. REWIND mode .....more than 0.53 ozs. (15 g)
  - c. F.F. mode .....more than 0.53 ozs. (15 g)
3. If tension is less than the above figures, adjust Idler Wheel-A spring for PLAY tension and F.F. spring for F.F. and REWIND tensions.

## PRESSURE PAD PRESSURE



1. Set the unit in PLAY mode.
2. Place a tension gauge at the center of tape pad.
3. Gradually draw the pad from the head until pad is disengaged from head and read the scale.
4. Proper pressure should be 1.05~1.60 ozs. (30~45 g).
5. If tension is not within the above range, adjust pad spring.



# AMPLIFIER ADJUSTMENTS

## RECORD/PLAYBACK HEAD AZIMUTH ADJUSTMENT

Instruments Required: V.T.V.M. Standard Alignment Tape,  $8\ \Omega$  Resistor.  
Measuring Circuit: Refer to Fig. 1.

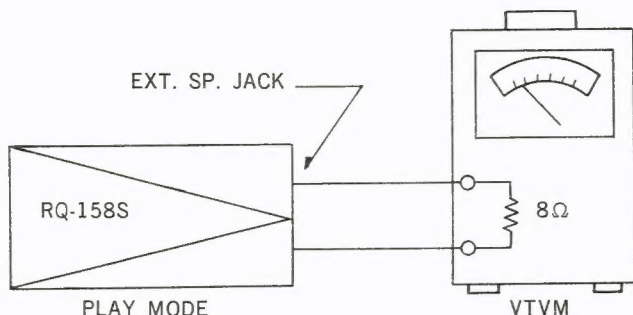


Fig. 1

Measuring Method:

1. As shown in Fig. 1, connect V.T.V.M. to Extension Speaker Jack of model RQ-158S and terminate with  $8\ \Omega$  resistor.
2. Thread Standard Alignment Tape (azimuth adjustment part) and set recorder to PLAYBACK mode.
3. Turn head adjustment screw for maximum reading at V.T.V.M.
4. After completion of above adjustment, lock screw with paint.
5. Adjust levels of heads (in relation to Erase Head) as in Fig. 2. For quick check, lift pressure pad assemblies with fingers and note position of tape in relation to heads.

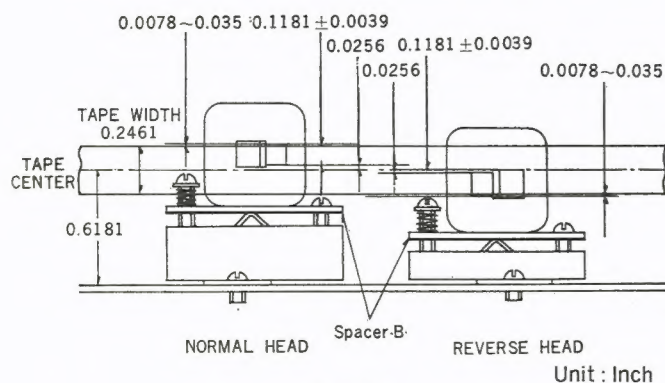


Fig. 2

**NOTE:** A. The levels of heads are to be adjusted by spacer-B, so place the proper number of spacers according to the color code indicated on the head.

Color code on the head	No. of spacers required
Red	2 pcs.
None	1 pc.
Black	Nil

B. Care must be taken in mounting the head assembly for the reverse operation. The erase record and playback slits on the "reverse" head assembly are located in reverse positions

in comparison to the head assembly for "regular" direction Operation.

C. Care must also be taken in checking the pressure pad contact to the head. The pad must be pressed against head correctly (vertically to the head and in parallel to the tape) and also there should not be any difference in tape motion whether the pad is in contact or not, both for normal and reverse operations.

## RECORD BIAS FREQUENCY ADJUSTMENT

Instruments Required: Oscilloscope, AF Oscillator,  $100\ \Omega$  Resistor.  
Measuring Circuit: Refer to Fig. 3.

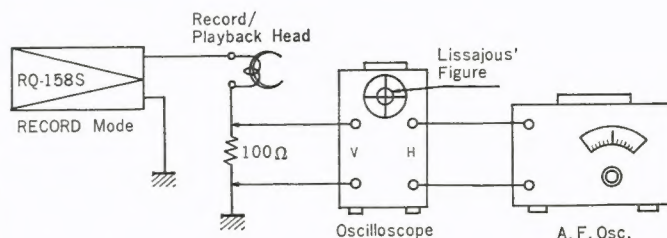


Fig. 3

Measuring Method:

1. As shown in Fig. 3, insert a  $100\ \Omega$  resistor to ground lead wire of Record Head and connect vertical axis of Oscilloscope across resistor; connect horizontal axis of Oscilloscope to output terminal of AF Oscillator.
2. When model RQ-158S is set to RECORD mode, connected as above and volume control (VR-2) set at minimum and VR-4 (semi-fixed variable resistor for bias current adjustment) set at center positions, Lissajous' figure will appear on the Oscilloscope; refer to this figure to check frequency of bias oscillator. Standard frequency is  $30\sim 40\text{ KC}$ .
3. If frequency is not within above range, adjust core of T4 (Bias Oscillator Coil) until above frequency is obtained.

**NOTE:** The above adjustment must be made for both "normal" and "reverse" operation heads. Also, lock cores with paint after adjustments.

## RECORD BIAS CURRENT ADJUSTMENT

Instruments Required: V.T.V.M.  $100\ \Omega$  Resistor.  
Measuring Circuit: Refer to Fig. 4

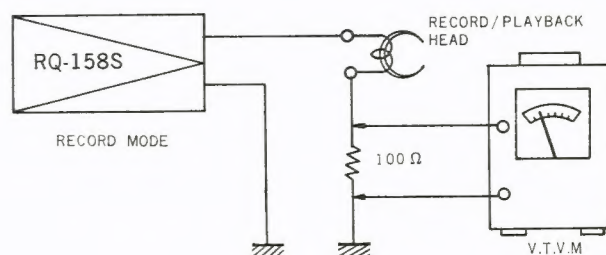


Fig. 4



#### Measuring Method:

1. As shown in Fig. 4, insert  $100\ \Omega$  resistor to ground lead wire of Record Head and connect VTVM across resistor.
2. When recorder is set to RECORD mode with volume control set at minimum, BIAS (to be fed to Record Head) will be indicated at V.T.V.M.
3. As standard bias current for model RQ-158S is set between 0.6 and 0.8 mA, VTVM reading should be between 60 and 80 mV ( $0.6 \sim 0.8\ \text{mA} \times 10^{-3} \times 100\ \Omega = 60 \sim 80\ \text{mV}$ ). If out of range, adjust VR-4.

**NOTE:** The above adjustment must be made for both "normal" and "reverse" operation heads. Record/Playback and Erase heads are connected to assure correct phase relationships, so do not reverse connections to any of the heads, as this will result in an increase in noise and distortion.

#### ERASE CURRENT ADJUSTMENT

Instruments Required: DC Milliammeter (having range of 0~20 mA or 50 mA).

Measuring Circuit: Refer to Fig. 5

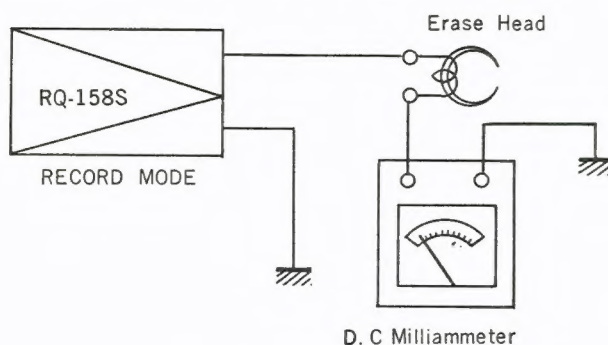


Fig. 5

#### Measuring Method:

1. Disconnect wiring from ground side of erase head and insert DC Milliammeter between wire and terminal as shown in Fig. 5.
2. When recorder is set to RECORD mode, with volume control (VR-2) set at minimum position, DC Milliammeter will indicate erase current.
3. Standard erase current is between 7~11 mA. If current measured is not within above range replace R-31 resistor (Lower resistance value if current is low and vice versa).

**NOTE:** DC Milliammeter must be accurate. If "DC Current Range" of regular "VOM" is used, it should be calibrated for accurate reading.

#### RECORD LEVEL ADJUSTMENT

Instrument Required: AF Oscillator, Attenuator, VTVM,  $600\ \Omega$  and  $100\ \Omega$  Resistors.

Measuring Circuit: Refer to Fig. 6.

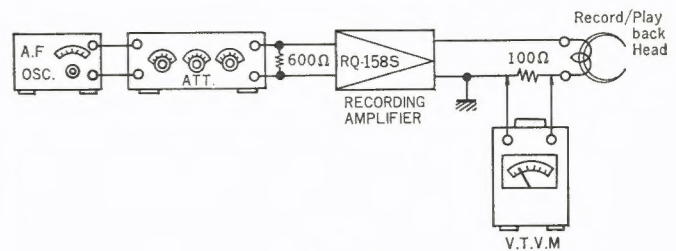


Fig. 6

#### Measuring Method:

1. Set Monitor Switch (S3) at "OFF". In order to cut-off bias current from oscillator circuit, insert a paper between the contacts of Bias Cut-off Switch (S10).
2. As shown in Fig. 6, connect output of AF Oscillator to Microphone Input Jack of model RQ-158S through Attenuator (terminate with  $600\ \Omega$  if impedance of attenuator is  $600\ \Omega$ ). Disconnect wiring from ground side of Record Head; insert  $100\ \Omega$  resistor between lead wire and terminal; connect V.T.V.M. across resistor.
3. Set recorder to RECORD mode, with volume control set at maximum and VR-3 (semi-fixed variable resistor for level adjustment) at center positions.
4. Set AF Oscillator output for 1 Kc, adjust attenuator to obtain 50 mV reading at V.T.V.M. Attenuation level at this setting should be  $-69 \sim -75\ \text{db}$ .
5. If attenuation level is not within above range, replace R-10 (Lower resistance value if current is low and vice versa).
6. Also confirm that the Level Meter setting at this moment is  $-3 \sim 3\ \text{db}$ .
7. If setting is not within above range, replace R-37 (Lower resistance value if setting is low and vice versa).

**NOTE:** The above adjustment must be made for both "normal" and "reverse" operation heads.

#### OVERALL LEVEL BALANCE (between normal and reverse operations) ADJUSTMENT

Instruments Required: AF Oscillator, Attenuator, V.T.T.M.  $600\ \Omega$  and  $8\ \Omega$  Resistors.

Measuring Circuit: Refer to Fig. 7

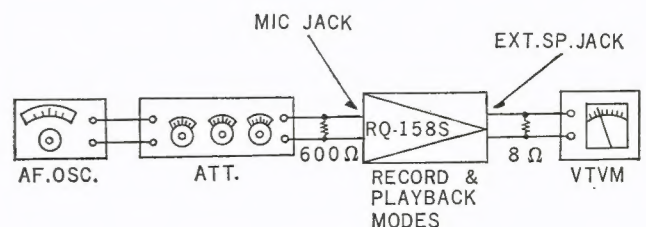


Fig. 7

#### Measuring Method:

1. As shown in Fig. 7, connect output of AF Oscillator to Microphone Input Jack of model RQ-158S through



Attenuator (terminate with 600  $\Omega$  if impedance of attenuator is 600  $\Omega$ ).

2. Connect V.T.V.M. to Extension Speaker Jack of model RQ-158S and terminate with 8  $\Omega$  resistor.
3. Set the recorder to RECORD mode with tone and volume controls set at maximum positions.
4. Set AF Oscillator output for 1 Kc, adjust attenuator to obtain O-VU reading at Level Meter and continue attenuation to further attenuate 15 db. Record signals in normal and reverse motions.
5. Playback tape. If the difference of VU meter readings between "normal" and "reverse" forward recording is more than 6 db, adjust VR-3 (semi-fixed variable resistor for level adjustment).

**NOTE:** The VR-3 is also related to the RECORD LEVEL, so adjust levels in relation to the others.

## VOICE OPERATION SENSITIVITY ADJUSTMENT

Instruments Required: AF Oscillator Attenuator, V.T.V.M. 600  $\Omega$  and 8  $\Omega$  Resistors.

Measuring Circuit: Refer to Fig. 7

### Measuring Method:

1. As shown in Fig. 7, connect output of AF Oscillator to Microphone Input Jack of model RQ-158S through Attenuator (terminate with 600  $\Omega$  if impedance of attenuator is 600  $\Omega$ ).
2. Connect VTVM to Extension Speaker Jack of model RQ-158S and terminate with 8  $\Omega$  resistor.
3. Set the recorder to RECORD mode with tone and volume controls set at maximum positions, monitor switch to "on", and voice control switch to "AUTO".
4. Set AF Oscillator output for 1 Kc, adjust attenuator to obtain 0.3 V reading at V.T.V.M.
5. First, turn VR-6 (semi-fixed variable resistor for voice control sensitivity adjustment) to maximum (extreme clockwise position) and gradually rotate it to counter-clockwise direction and stop rotation as soon as the motor JUST starts rotation.
6. If the motor does not start rotation with 0.3 V output, confirm whether the motor starts rotation with the signal 7 db below O-VU on the Level Meter with VR-6 set at minimum (extreme counter-clockwise position).
7. If the motor still does not start rotation with the above setting, check voice operation control circuit referring the Trouble Shooting Guide.

## REPLACEMENT PARTS LIST

ATTENTION: Please order Replacement Parts according to this Replacement Parts List. The Parts which are not listed up here will not be supplied.  
So a Part in an assembly has to be ordered as a whole assembly.

### RESISTORS

Ref. No.	Description	Part No.
R 1	Carbon Resistor 8.2 K $\Omega$ 1/4 Watt 10%	ERD-14VK822
R 2	Carbon Resistor 270 $\Omega$ 1/4 Watt 10%	ERD-14VK271
R 3	Carbon Resistor 82 K $\Omega$ 1/4 Watt 10%	ERD-14VK823
R 4	Carbon Resistor 18 K $\Omega$ 1/4 Watt 10%	ERD-14VK183
R 5	Carbon Resistor 2.2 K $\Omega$ 1/4 Watt 10%	ERD-14VK222
R 6	Carbon Resistor 47 $\Omega$ 1/4 Watt 10%	ERD-14VK470
R 7	Carbon Resistor 33 K $\Omega$ 1/4 Watt 10%	ERD-14VK333
R 8	Carbon Resistor 3.3 K $\Omega$ 1/4 Watt 10%	ERD-14VK332
R 9	Carbon Resistor 10 K $\Omega$ 1/4 Watt 1q%	ERD-14VK103
R 10	Carbon Resistor 180 K $\Omega$ 1/4 Watt 10%	ERD-14VK184
R 11	Carbon Resistor 2.7 K $\Omega$ 1/4 Watt 10%	ERD-14VK272
R 12	Carbon Resistor 47 K $\Omega$ 1/4 Watt 10%	ERD-14VK473
R 13	Carbon Resistor 10 K $\Omega$ 1/4 Watt 10%	ERD-14VK103
R 14	Carbon Resistor 2.2 K $\Omega$ 1/4 Watt 10%	ERD-14VK222
R 15	Carbon Resistor 1 K $\Omega$ 1/4 Watt 10%	ERD-14VK102
R 16	Carbon Resistor 15 K $\Omega$ 1/3 Watt 10%	ERD-14VK153
R 17	Carbon Resistor 1.8 K $\Omega$ 1/4 Watt 10%	ERD-14VK182
R 18	Carbon Resistor 180 $\Omega$ 1/4 Watt 10%	ERD-14VK181
R 19	Carbon Resistor 18 $\Omega$ 1/4 Watt 10%	ERD-14VK180
R 20	Carbon Resistor 1.2 K $\Omega$ 1/4 Watt 10%	ERD-14VK122
R 21	Solid Resistor 47 $\Omega$ 1/2 Watt 20%	ERC-12BFM470
R 22	Carbon Resistor 820 $\Omega$ 1/4 Watt 10%	ERD-14VK821
R 23	Carbon Resistor 2.7 K $\Omega$ 1/4 Watt 10%	ERD-14VK272
	Carbon Resistor 2.2 K $\Omega$ 1/4 Watt 10% (appropriate)	ERD-14VK222

Ref. No.	Description	Part No.
	Carbon Resistor (appropriable) 3.3 K $\Omega$ 1/4 Watt 10%	ERD-14VK332
	Carbon Resistor (appropriable) 3.9 K $\Omega$ 1/4 Watt 10%	ERD-14VK392
R 24	Wire Wound Resistor 1.5 $\Omega$ 1/2 Watt 10%	ERW-12L1R5
R 25	Carbon Resistor 100 $\Omega$ 1/4 Watt 10%	ERD-14VK101
R 26	Solid Resistor 10 $\Omega$ 1/2 Watt 20%	ERC-12BFM100
R 27	Carbon Resistor 2.7 K $\Omega$ 1/4 Watt 10%	ERD-14VK272
R 28	Carbon Resistor 560 $\Omega$ 1/4 Watt 10%	ERD-14VK561
R 29	Carbon Resistor 100 $\Omega$ 1/4 Watt 10%	ERD-14VK101
R 30	Carbon Resistor 27 K $\Omega$ 1/4 Watt 5%	ERD-14VJ273
R 31	Carbon Resistor 560 $\Omega$ 1/4 Watt 10%	ERD-14VK561
R 32	Carbon Resistor 18 K $\Omega$ 1/4 Watt 10%	ERD-14VK183
R 33	Carbon Resistor 47 $\Omega$ 1/4 Watt 10%	ERD-14VK470
R 34	Carbon Resistor 4.7 $\Omega$ 1/4 Watt 10%	ERD-14VK4R7
R 35	Carbon Resistor 2.7 K $\Omega$ 1/4 Watt 10%	ERD-14VK272
R 36	Carbon Resistor 2.2 K $\Omega$ 1/4 Watt 10%	ERD-14VK222
R 37	Carbon Resistor 1 K $\Omega$ 1/4 Watt 10%	ERD-14VK102
	Carbon Resistor (appropriable) 1.8 K $\Omega$ 1/4 Watt 10%	ERD-14VK182
	Carbon Resistor (appropriable) 560 $\Omega$ 1/4 Watt 10%	ERD-14VK561
R 38	Carbon Resistor 100 $\Omega$ 1/4 Watt 10%	ERD-14VK101

#### VARIABLE RESISTORS

VR 1	Variable Resistor 20K $\Omega$ -C	EVH-BOA21C24
VR 2	Variable Resistor 5K $\Omega$ -C	EVH-BOAL21C53
VR 3	Variable Resistor 2K $\Omega$ -B	EVL-TOAA00B23
VR 4	Variable Resistor 500 $\Omega$ -B	EVL-TOAA00B52
VR 6	Variable Resistor 2K $\Omega$ -B	EVL-TOAA00B23

#### CAPACITORS

C 1	Electrolytic Capacitor 3 $\mu$ F WV 15 V	ECE-A15V3
C 2	Electrolytic Capacitor 30 $\mu$ F WV 6 V	ECE-A6V30
C 3	Electrolytic Capacitor 5 $\mu$ F WV 10 V	ECE-A10V5
C 4	Electrolytic Capacitor 3 $\mu$ F WV 15 V	ECE-A15V3
C 5	Electrolytic Capacitor 1 $\mu$ F WV 50 V	ECE-A50V1M
C 6	Mylar Capacitor 0.047 $\mu$ F WV 50 V	ECQ-M05473MZ
C 7	Polystyrene Capacitor 680 PF WV 125 V	ECQ-S1681KZ
C 8	Electrolytic Capacitor 10 $\mu$ F WV 6 V	ECE-A6V10
C 9	Electrolytic Capacitor 50 $\mu$ F WV 10 V	ECE-A10V50
C 10	Electrolytic Capacitor 10 $\mu$ F WV 6 V	ECE-A6V10
C 11	Electrolytic Capacitor 100 $\mu$ F WV 3 V	ECE-A3V100
C 12	Electrolytic Capacitor 500 $\mu$ F WV 10 V	ECE-A10V500
C 13	Polystyrene Capacitor 560 PF WV 125 V	ECQ-S1561KZ
C 14	Mylar Capacitor 0.0056 $\mu$ F WV 50 V	ECQ-M05562MZ
C 15	Mylar Capacitor 0.0056 $\mu$ F WV 50 V	ECQ-M05562MZ
C 16	Polystyrene Capacitor 3900 PF WV 125 V	ECQ-S1392KZ
C 17	Electrolytic Capacitor 150 $\mu$ F WV 15 V	ECE-A15V150
C 18	Electrolytic Capacitor 150 $\mu$ F WV 15 V	ECE-A15V150
C 19	Electrolytic Capacitor 4 $\mu$ F WV 15 V	ECE-A15V4I
C 20	Mylar Capacitor 0.1 $\mu$ F WV 50 V	ECQ-M05104MZ
C 21	Electrolytic Capacitor 200 $\mu$ F WV 6 V	ECE-A6V200
C 22	Electrolytic Capacitor 50 $\mu$ F WV 6 V	ECE-A6V50
C 23	Mylar Capacitor 0.001 $\mu$ F WV 50 V	ECQ-M05102MZ
C 25	Electrolytic Capacitor 5 $\mu$ F WV 10 V	ECE-A10V5
C 26	Electrolytic Capacitor 5 $\mu$ F WV 10 V	ECE-B15V5
C 27	Electrolytic Capacitor 50 $\mu$ F WV 3 V	ECE-A3V50
C 28	Electrolytic Capacitor 100 $\mu$ F WV 15 V	ECE-A15V100
C 29	Electrolytic Capacitor 5 $\mu$ F WV 15 V	ECE-B15V5



## TRANSISTORS

Ref. No.	Description	Part No.
Tr 1	Transistor	2SB 173(A)
Tr 2	Transistor	2SB 175(B)
Tr 3	Transistor	2SB 175(B)
Tr 4	Transistor	2SB 324
Tr 5	Transistor	2SB 324
Tr 6	Transistor	2SB 172(A)
Tr 7	Transistor	2SB 175(A)
Tr 8	Transistor	2SB 175(A)
Tr 9	Transistor	2SB 176(R)

## THERMISTORS

SM 1	Thermistor MT-81	QVM-800A
SM 2	Thermistor 5A-120	QVM-201A

## DIODE

D	Diode OA-70
---	-------------

## TRANSFORMERS

T 1	Input Transformer	QLA-0108-2
T 2	Output Transformer	QLA-0325
T 3	Oscillator Transformer	QLB-0108
T 4	Choke Transformer	QLP-0105

## SWITCHES

S 1	Slide Switch (Record/Play)	ESD-1610
S 2	Slide Switch (Head Connection)	ESD-1610
S 3	Slide Switch (Monitor Selector)	QSS-1002
S 4	Leaf Switch (Plunger Power/Stop Switch)	— QSB-0136
S 5	Micro Switch (Power)	QSM-0009
S 6	Leaf Switch (Instant Stop)	QSB-0148
S 7	Leaf Switch (Remote Cut-off)	QSB-0146
S 8	Slide Switch (Auto/Manual)	ESS-1013
S 10	Leaf Switch (Bias Cut-off)	QSB-0149

## MECHANICAL PARTS

Ref. No.	Description	Part No.
1 M750	Tape Guide Post Screw, Left	QAG-1068
2 M751	Plastic Insulation Pipe	QAG-1072
3 M752	Sensing Lug	QAG-1069
4 M753	Tape Guide Washer, Left	QAG-1070
5 M754	Tape Guide, Left	QAG-1071
6 M755	Fiber Washer, 4.1×1.5×0.5	QAG-1073
7 M756	Tape Guide Plate Assembly	—
8 M757	Fiber for Left Tape Guide	QAG-1074
9 M758	Fiber Washer, 4.2×9.0×1.0	QBK-7017
10 M759	Nut, Left Tape Guide	QAG-1075
15 M760	Washer for Head Mounting Screw	— QWQ-1067
16 M761	Head Mounting Spring	QBC-1035
17 M762	Head Mounting Plate Assembly, Left	—
20 M763	Fiber Washer, 4.0×7.0×0.5	QBK-7067
21 M764	Pressure Pad Spring, Left	QAP-1096
22 M765	Pressure Pad Assembly, Left	—
23 M767	Tape Guide Post Screw, Right	QAG-1076
24 M768	Tape Guide Washer, Right	QAG-1005
25 M769	Tape Guide, Right	QAG-1008
26 M770	Tape Guide Plate, Right	QAG-1077
27 M771	Tape Guide Collar, Right	QAG-1078
28 M772	Head Mounting Plate Assembly, Right	—

Ref. No.	Description	Part No.
29 M773	Pressure Pad Assembly, Right	—
30 M774	Pressure Pad Spring, Right	QAP-1097
32 M775	Duracon Washer, 4.1×5.5×0.5	QBJ-3027
33 M776	Pressure Roller	QDP-1097
36 M777	Pressure Pad Lever Assembly	—
37 M778	Pressure Roller Lever Assembly	—
39 M779	Pressure Roller Lever Shaft	QMS-1182
40 M780	Pressure Roller Lever Spring	QBN-1025
41 M781	Pressure Roller Lever Spring Hook	—
42 M782	Fiber Washer	—
43 M783	Washer	QTW-1019
45 M784	Volume Control Holder	—
46 M785	Baseplate Assembly Upper	—
47 M786	Tape Counter Belt	QDB-0051
48 M787	Tape Counter	QDC-0011
49 M788	Hexagonal Nut, 1.3t	—
50 M789	Flywheel Bearing, Upper	QMM-1087
51 M790	Capstan Bearing Holder	—
53 M791	Idler Wheel-A Spring	QBP-1072
54 M792	Upper Idler Wheel-A Assembly	QXI-0009
54-1 M793	Felt for Upper Idler Wheel-A	—
55 M794	Idler Wheel-A Washer	QWQ-1069
56 M795	Lower Idler Wheel-A Assembly	QXI-0010
58 M796	Idler Wheel-A Belt	QDB-0052
59 M797	Idler Wheel-A Shaft	QMS-1184
60 M798	Reel Table Screw	QHT-230×5C3
61 M799	Reel Table Assembly Left	QXP-0124-1
62 M800	Felt Assembly Left Reel Table	—
63 M802	Reel Table Shaft	QMS-1185
65 M803	Reel Table Assembly, Right	QXP-0125-1
44 M804	Pressure Pad See-saw Lever	—
66 M805	F.F. Roller Felt	QBF-1084
67 M806	F.F. Roller	QDP-1099
68 M807	F.F. Roller Lever Assembly	—
69 M808	F.F. Roller Lever Spring	QBT-1043
70 M809	F.F. Roller Lever Shaft	—
71 M810	Fiber Washer, 5.0×9.0×0.5	QBK-7042
72 M811	Brake Assembly, Left	—
73 M813	Brake Spring	QBT-1146
74 M814	Idler Wheel-B	QXI-0008
75 M815A	Idler Bracket-B Assembly	—
76 M816A	Idler Wheel-B Bracket	—
77 M817	Idler Bracket-A Assembly	—
78 M818	Motor Pulley	QDP-1098
79 M819	Flywheel Belt	QDB-0053
80 M820	Motor Bracket	—
85 M695	Pipe	QKT-1119
86 M694	Motor Mounting Rubber Cushion	QBC-1055
87 M821	Slide Switch Rod Assembly	—
88 M822	Brake Assembly, Right	—
89 M823	Brake Rod Assembly	—
90 M824	Brake Shaft	—
91 M825	Slide Switch Rod Bracket	—
92 M826	Capstan (3-3/4 ips.)	QMP-1079
93 M827	Flywheel	QXF-0026
94 M828	Steel Thrust Ball	QDK-1001
95 M829	Stay-B	—
96 M830	Stay-A	—
97 M831	F.F. Roller Rod	—
98 M832	F.F. Roller Rod Spring	QBT-1147
99 M833	Pressure Roller Lever-B Assembly	—

Ref. No.	Description	Part No.
100	M834 Rod Bracket-B	—
101	M835 Rod Bracket-A	—
102	M836 Play Lever Spring-A	QBT-1148
103	M837 Play Lever Spring-B	QBT-1149
104	M838 Play Rod-A	—
105	M839 Play Rod-B Assembly	—
106	M840 Play Lever Assembly	—
107	M841 Instant Stop Rod	—
108	M842 Instant Stop Spring	QBC-1045
109	M843 Lever Meter Holder	—
110	M844 Baseplate Assembly, Lower	—
111	M845 Push Button Spring	QBP-1071
112	M846 Push Button Assembly	QXB-0042
113	M847 Play Button Assembly	QXB-0043
114	M848 Push Button Holder Shaft-A	—
115	M849 Push Button Frame Shaft	—
116	M850 Push Button Lock Plate	—
117	M851 Brake Wire	QBI-1004
118	M852 Slide Switch Rod Spring	QBT-1150
122	M853 Idler Wheel-A Bearing Holder	—
123	M165 Hexagonal Nut, N8 $\phi$	QNN-8032B1
125	M854 Idler Wheel-A Shaft Bearing	QMM-1088
126	M855 Amplifier Mounting Angle	—
127	M856 Plunger Rod	—
128	M857 Split Pin	—
129	M858 Push Button Lock Spring	QBP-1073
131	M859 Record Lever-B	—
132	M860 Flywheel Bearing, Lower	—
133	M861 Push Button Frame Shaft, 2.5 $\phi$	—
134	M862 See-saw Metal	—
135	M863 Instant Stop Metal	—
136	M864 F.F. Rod Assembly	—
137	M865 Flywheel Thrust Steel Ball	—
138	M866 Pressure Pad See-saw Lever Metal	—
130	M867 Motor	QDM-0921
139	M868 Capstan Holding Nut	QHQ-1067
140	M880 Rubber Washer 5 $\times$ 9.0 $\times$ 0.6	QBG-1069
83	X160 Small Screw, —M2.6 $\phi$ $\times$ 4	QHM-126 $\times$ 4U3
13	X162 Small Screw, —M2 $\phi$ $\times$ 10	QHM-120 $\times$ 10U3
81	X166 Small Screw, —M2.6 $\phi$ $\times$ 8	QHM-126 $\times$ 8U3
57	X167 Small Screw, —M2.6 $\phi$ $\times$ 10	QHM-126 $\times$ 10U3
17	X171 Small Screw, —M3 $\phi$ $\times$ 5	QHM-130 $\times$ 5U3
52	X175 Small Screw, —M3 $\phi$ $\times$ 12	QHM-130 $\times$ 12U3
14	X190 Small Screw, —M2 $\phi$ $\times$ 6	QHM-120 $\times$ 6U3
18	X194 Small Screw, —M2.6 $\phi$ $\times$ 18	QHM-126 $\times$ 8U3
121	X334 Fiber Washer, 4.2 $\times$ 9.0 $\times$ 0.5	QBK-7033
35	X343 Fiber Washer, 7.0 $\times$ 12.0 $\times$ 0.25	QBK-7037
64	X343 Fiber Washer, 7.0 $\times$ 12.0 $\times$ 0.25	QBK-7037
82	X363 Spring Washer, SW2.6 $\phi$	QWS-262T3
11	X364 Spring Washer, SW3 $\phi$	QWS-302U3
119	X365 Spring Washer, SW4 $\phi$	QWS-402T3
124	X366 Spring Washer, SW8 $\phi$	QWS-802T3
84	X375 Flat Washer 2.6 $\phi$	QWP-2612N1
38	X384 E-type Washer, E4 $\phi$	QNS-404U3
34	X385 E-type Washer, E5 $\phi$	QNS-504U3
31	X387 E-type Washer, E3 $\phi$	QNS-404U3
12	X394 Hexagonal Nut, N3 $\phi$	QNN-3022U3
120	X395 Hexagonal Nut, N4 $\phi$	QNN-4022U3

#### ELECTRICAL PARTS

151	E470	Normal Operation Head Assembly WY-007X
152	E471	Reverse Operation Head Assembly WY-007W
153	E472	Level Meter QSL-0021
154	E473	11-P Multi-connector QJS-0108

Ref. No.	Description	Part No.
155	E474 Jack, M3-B	QJA-0104
156	E475 Jack Unit-B	QJA-0111
157	E476 Midget Power Relay (S9)	QSK-0102
158	E477 Plunger	QME-0105
159	E487 Speaker	EAS-15D50SF
160	E478 Printed Circuit Board-A	QEM-1003
161	E479 Printed Circuit Board-B	QEM-1004
162	E480 Printed Circuit Board-C	QEI-0074
163	E482 Heat Dissipating Angle	QTT-179
164	E483 Heat Dissipating Cap	QTH-1001
165	E484 Output Transformer Angle	QTT-1205
166	E485 Record Lever-A	QML-1152
167	E481 Record Lever Spring	QHT-1096
168	E486 Spacer-B (Head Height Adjustment)	QTW-1006
169	E444 Head Shielding Cover	QTS-1013-1

#### CABINET PARTS

180	G440	Case Lid Assembly	QYA-0042
181	G441	Case Body Assembly	QYB-0087
181-1	G442	Case Side Plate, Right	QKG-1083
181-2	G443	Case Side Plate, Left	QKG-1084
181-3	G444	Handle	QKH-1022
181-4	G445	Small Screw, +MS3 $\phi$ $\times$ 6	QHV-230 $\times$ 6C1
181-5	G446	Front Panel Assembly	QYK-0010
181-6	G447	Tapping Screw, +BH3 $\phi$ $\times$ 8	QHB-530 $\times$ 8U3
181-7	G448	Washer	QWQ-1055
181-8	G449	Vibration Absorber	QBC-1063
181-9	G450	Capstan Rest	QMS-1129
182	G451	Case Bottom Assembly	—
182-1	G452	Pocket Lid Assembly	—
182-2	G453	Tapping Screw, +S3 $\phi$ $\times$ 10	QHS-530 $\times$ 100V3
183	G454	Head Cover Assembly	QYR-0047
184	G455	CUE Button	QGO-4021-1
185	G456	Battery Lid Assembly	QEO-0049
186	G457	Small Screw, +M4 $\phi$ $\times$ 20	QHM-240 $\times$ 20V3
187	G458	Screw	QHQ-1046
188	G459	Jack Mount	QCJ-1048
189	G460	Volume Control Knob Right	QYT-0041
191	G461	Volume Control Knob, Left	QYT-0043
190	X174	Screw, Round Head M3 $\phi$ $\times$ 10	QHM-230 $\times$ 10U3

#### ACCESSORIES

A 1	Dynamic Microphone (with Stand)	WM-2095N
A 1-1	Microphone Stand	WN-105N
A 2	5" Recording Tape	QFT-5NR49Z
A 3	5" Empty Reel	QFR-5NZ
A 4	2 Pin Plug B	QJP-0910
A 5	Magnetic Earphone	QAE-1QB1
A 6	Connection Cord-R	QEB-0017
A 7	Splicing Tape	QFS-0002-1
A 8	Sensing Tape	QFS-0004
A 9	Carrying Bag	QFK-0014
A 10	Instruction Book	QTT-0196

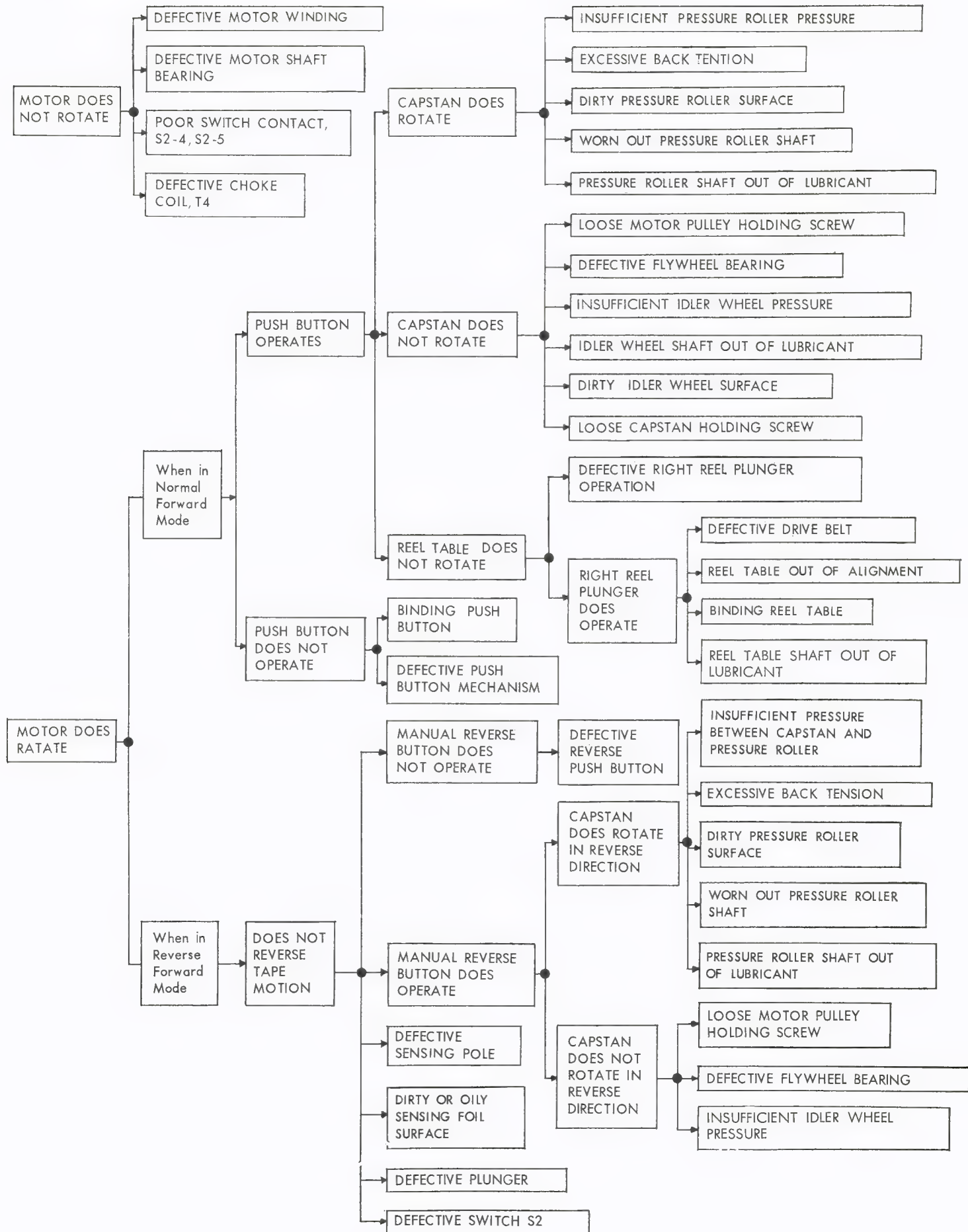
#### PACKING

P 1	Packing Case	QPN-1318
P 2	Inner Cushion (A)	QPN-1233
P 3	Inner Cushion (B)	QPN-1234
P 4	Inner Cushion (E)	QPN-1238
P 5	Accessory Case	QPW-1051
P 6	Paper Cushion (A)	QPW-1052
P 7	Paper Cushion (B)	QPW-1053
P 8	Gauze	QPO-1010



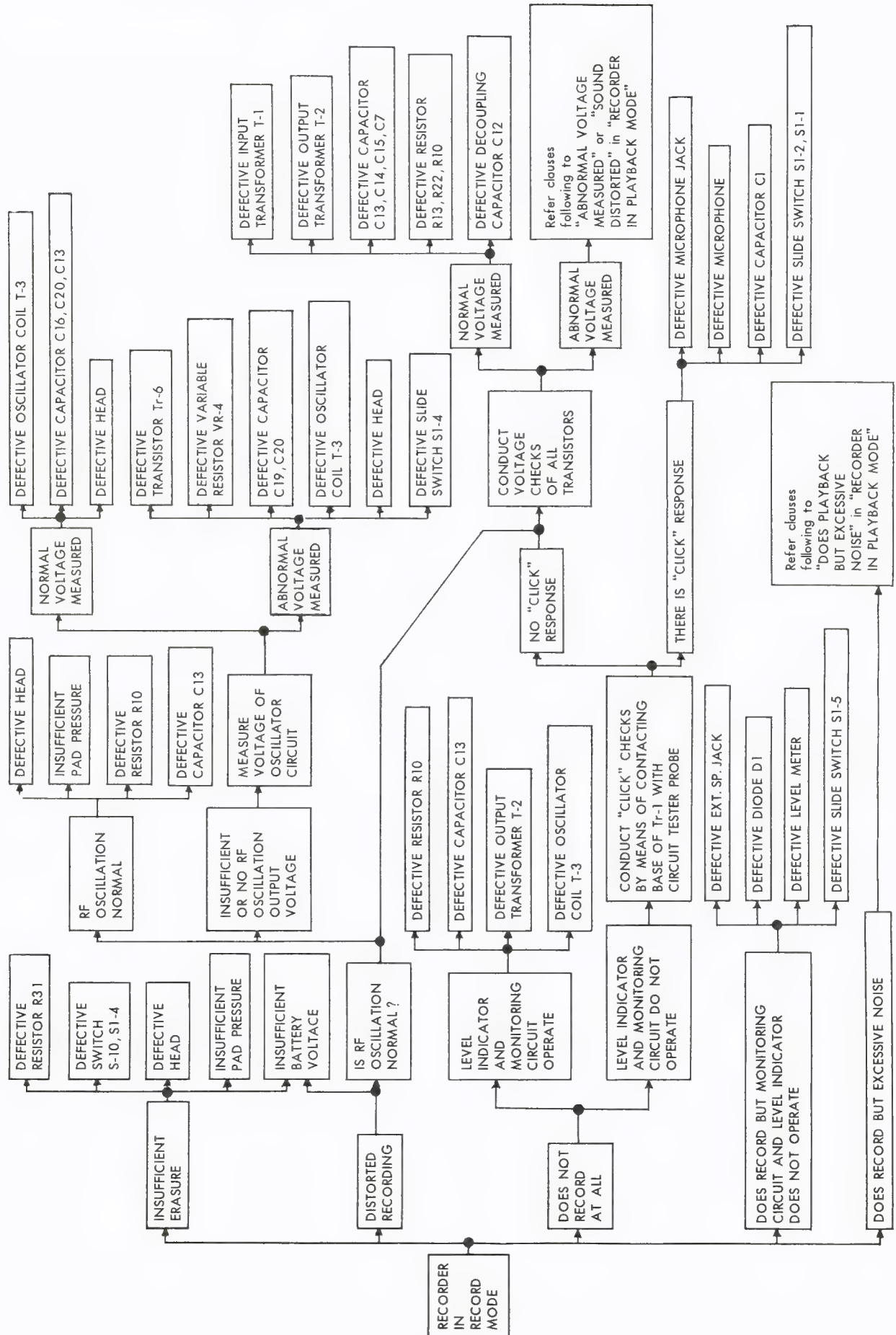
# TROUBLE SHOOTING GUIDE 1

## MALFUNCTIONS IN RECORD/PLAYBACK MOTION



# TROUBLE SHOOTING GUIDE 2

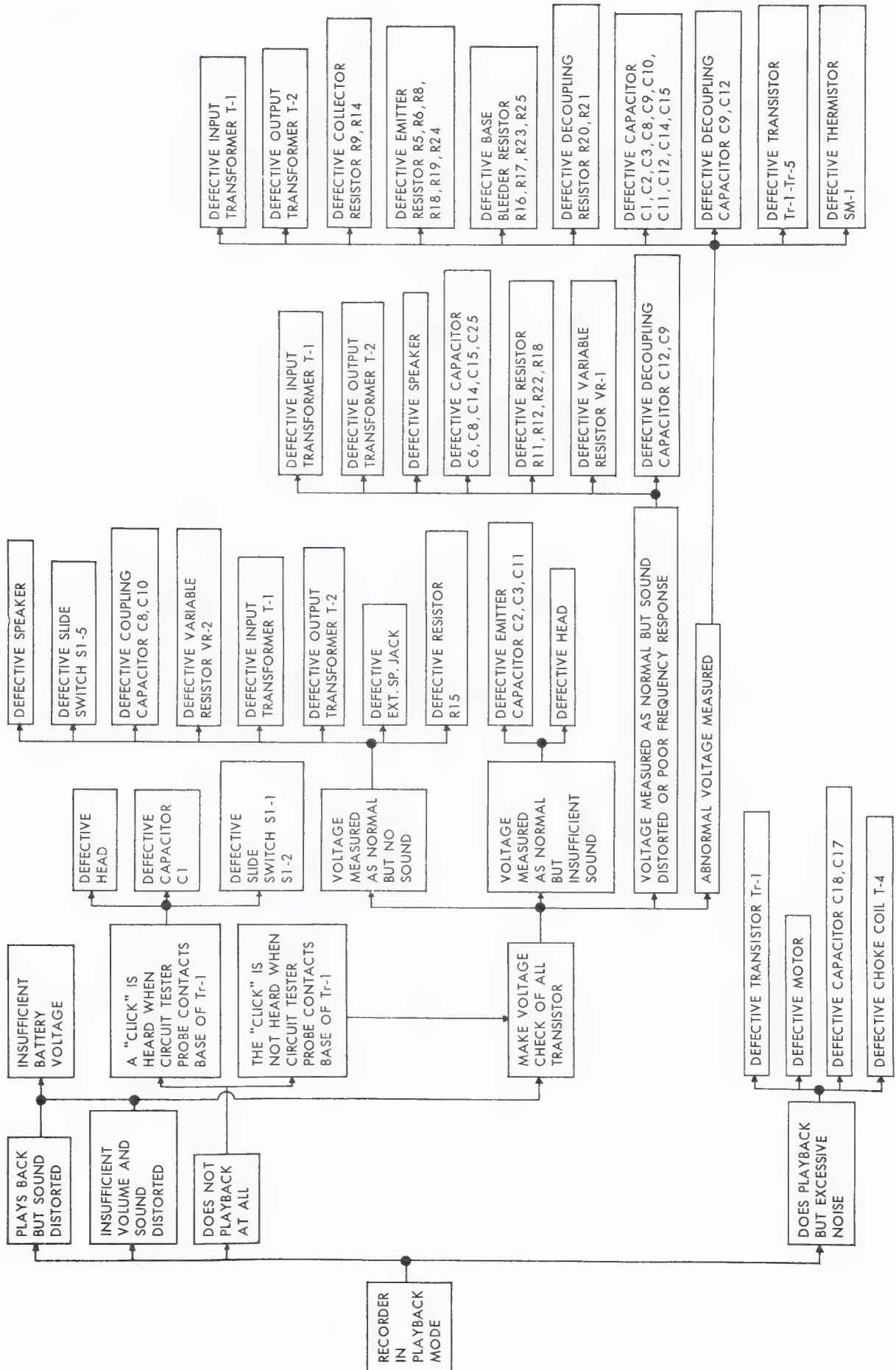
## DEFECTIVE RECORDING CIRCUIT





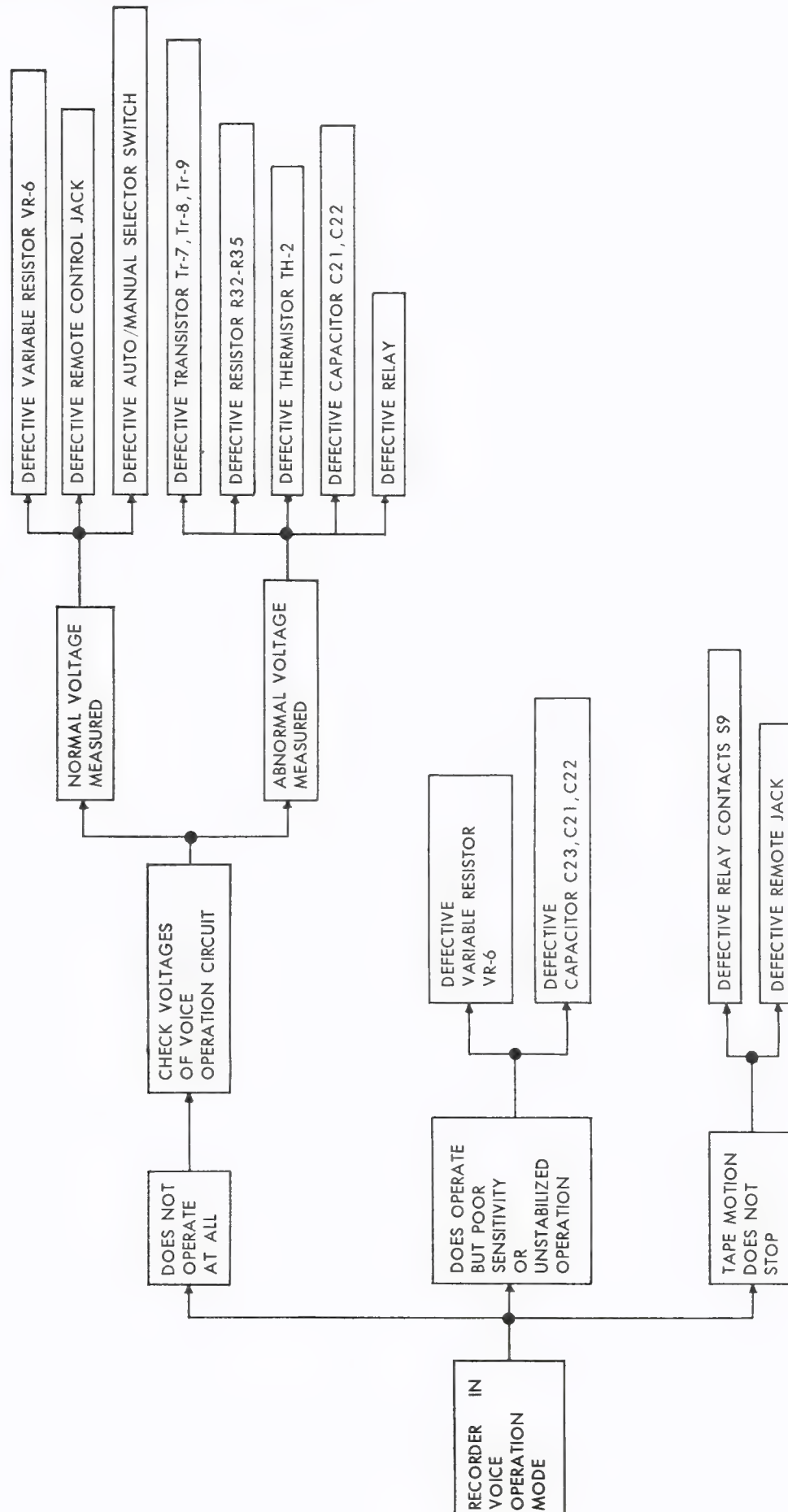
# TROUBLE SHOOTING GUIDE 3

## DEFECTIVE PLAYBACK CIRCUIT



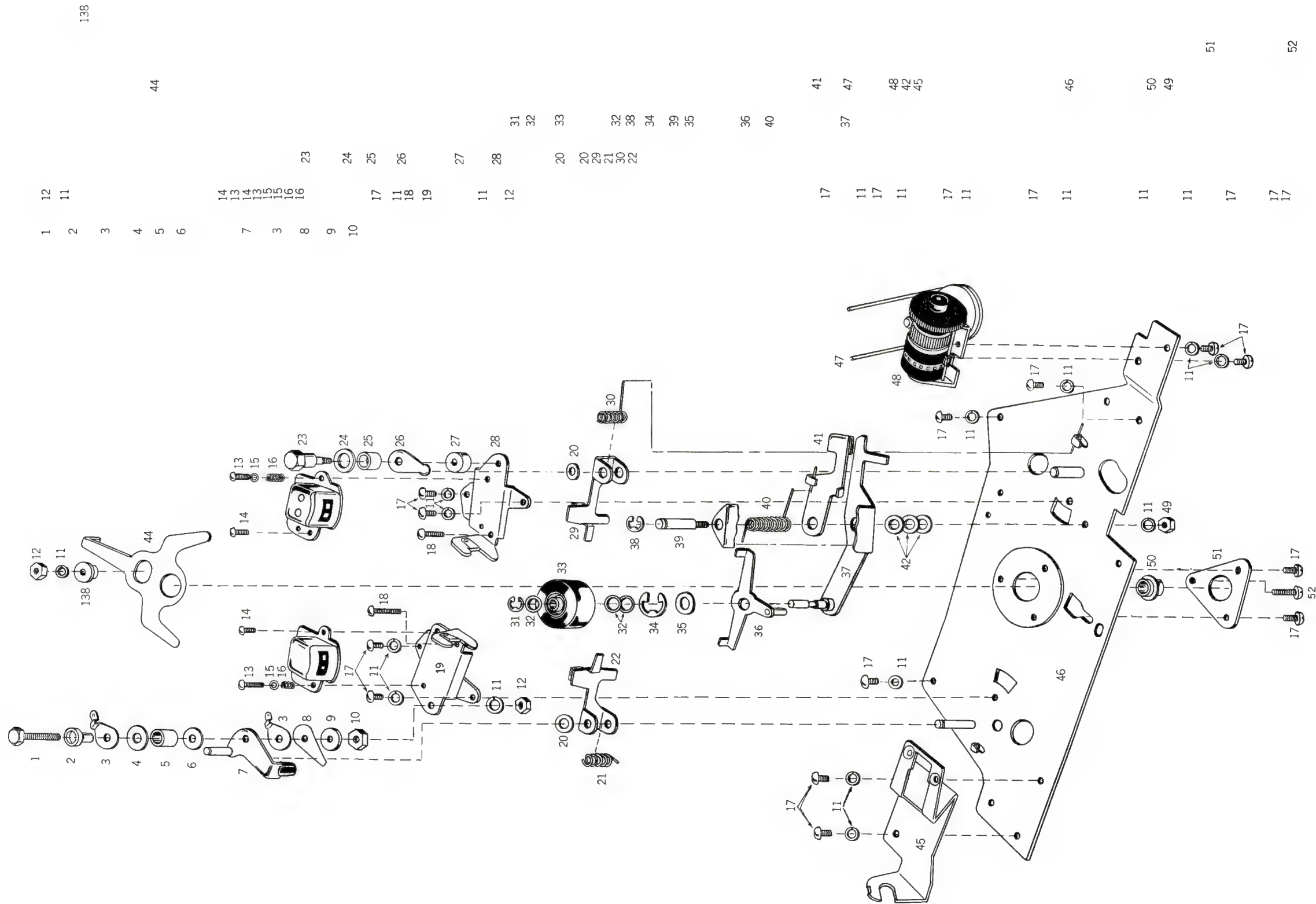
# TROUBLE SHOOTING GUIDE 4

## DEFECTIVE VOICE OPERATION CIRCUIT



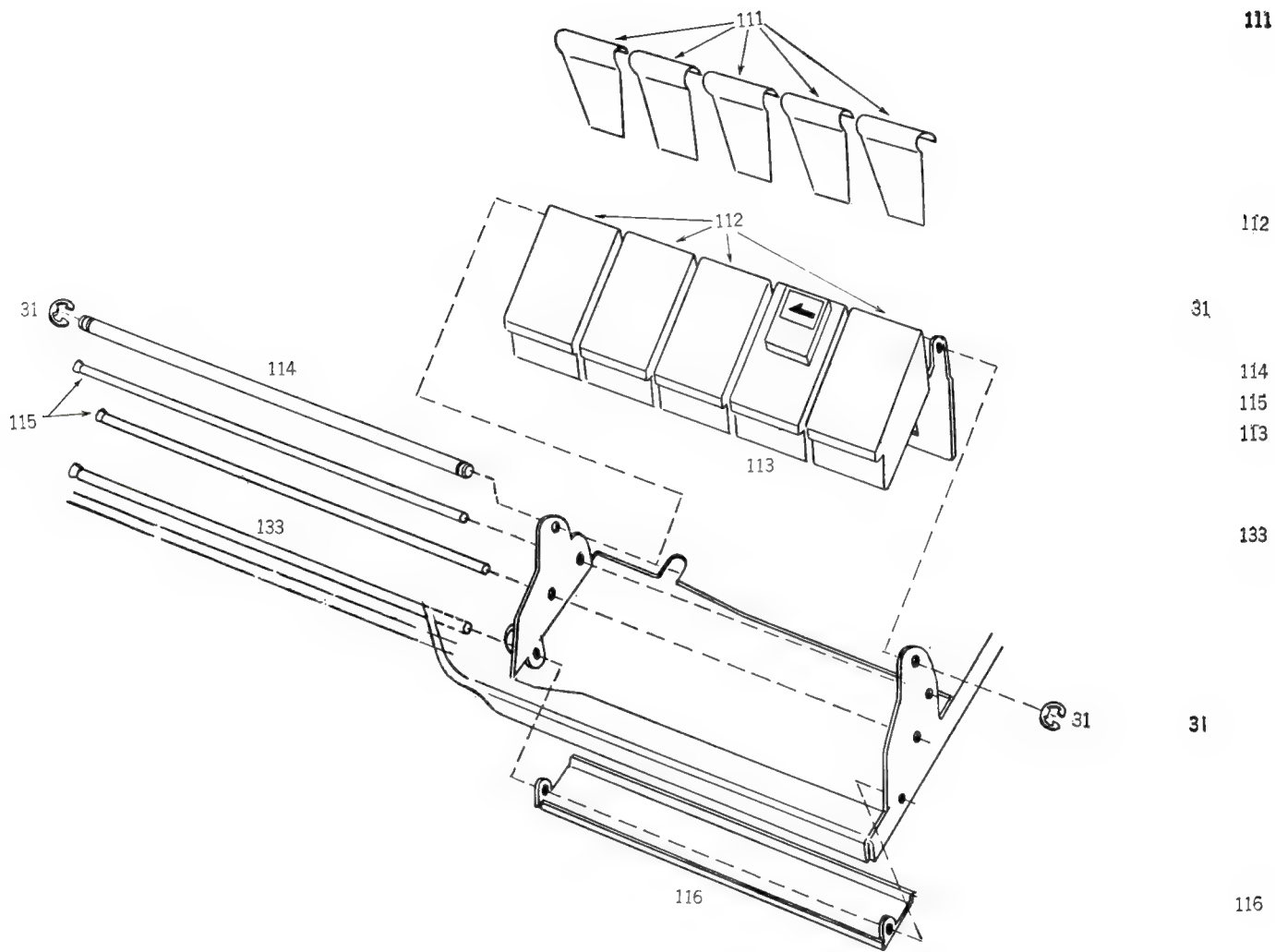


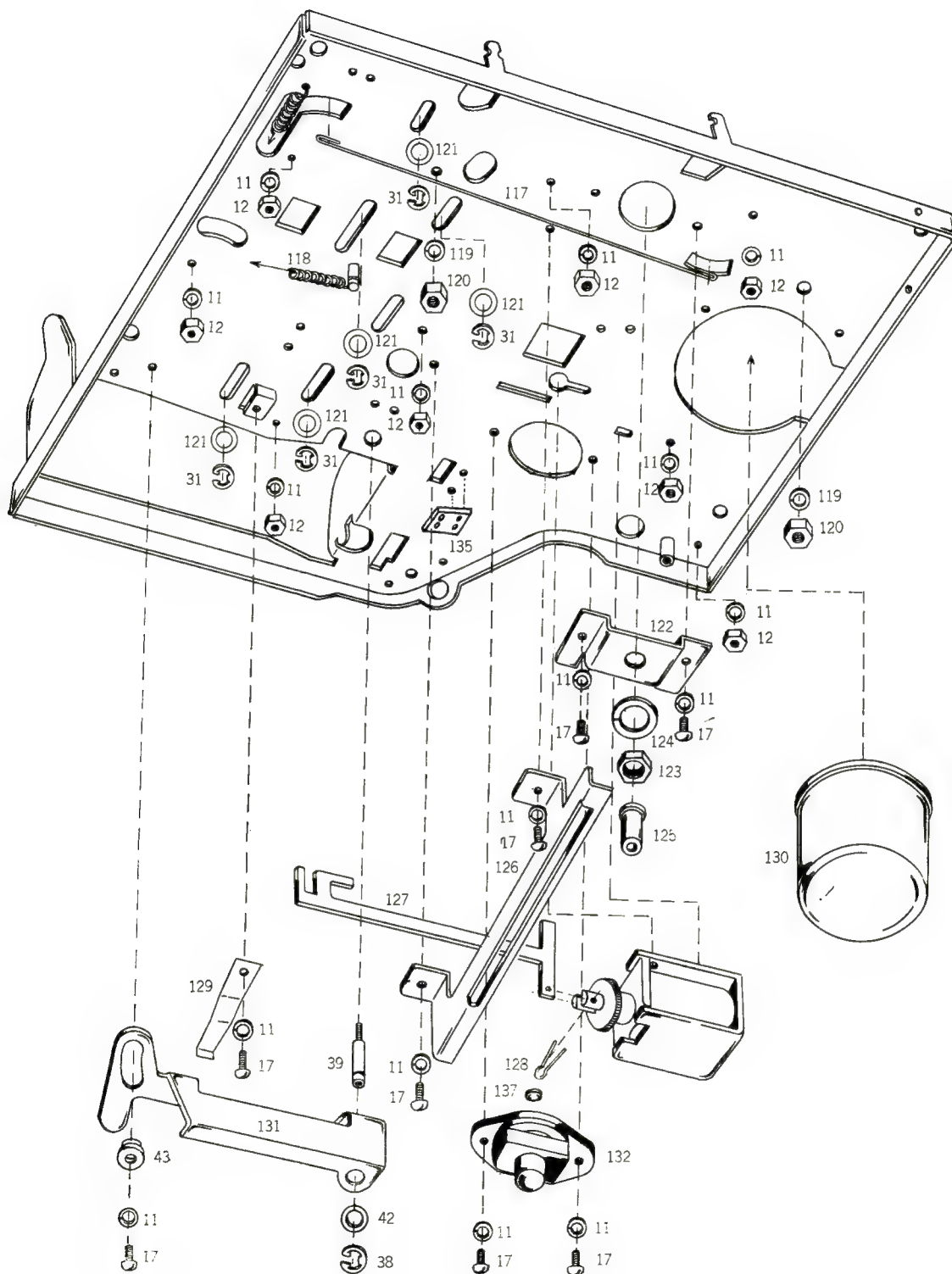
EXPLODED VIEWS







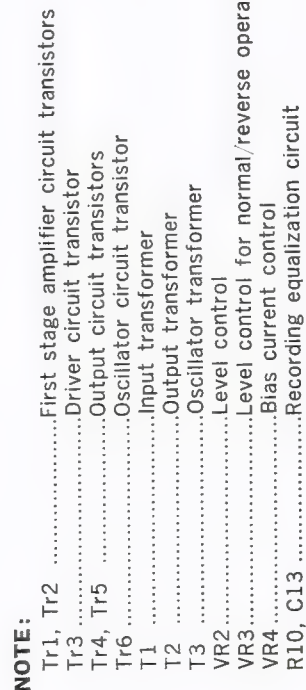




11	121
12	31
	117
	119
11	118
11	120
12	121
12	121
11	31
12	121
	31
11	121
12	121
11	31
11	31
12	119
11	120
12	120
	135
11	122
12	
11	
11	124
17	123
17	
11	125
17	130
	126
	127
	129
11	39
17	128
11	137
17	
	131
	132
	43
11	42
11	
17	38
17	
17	

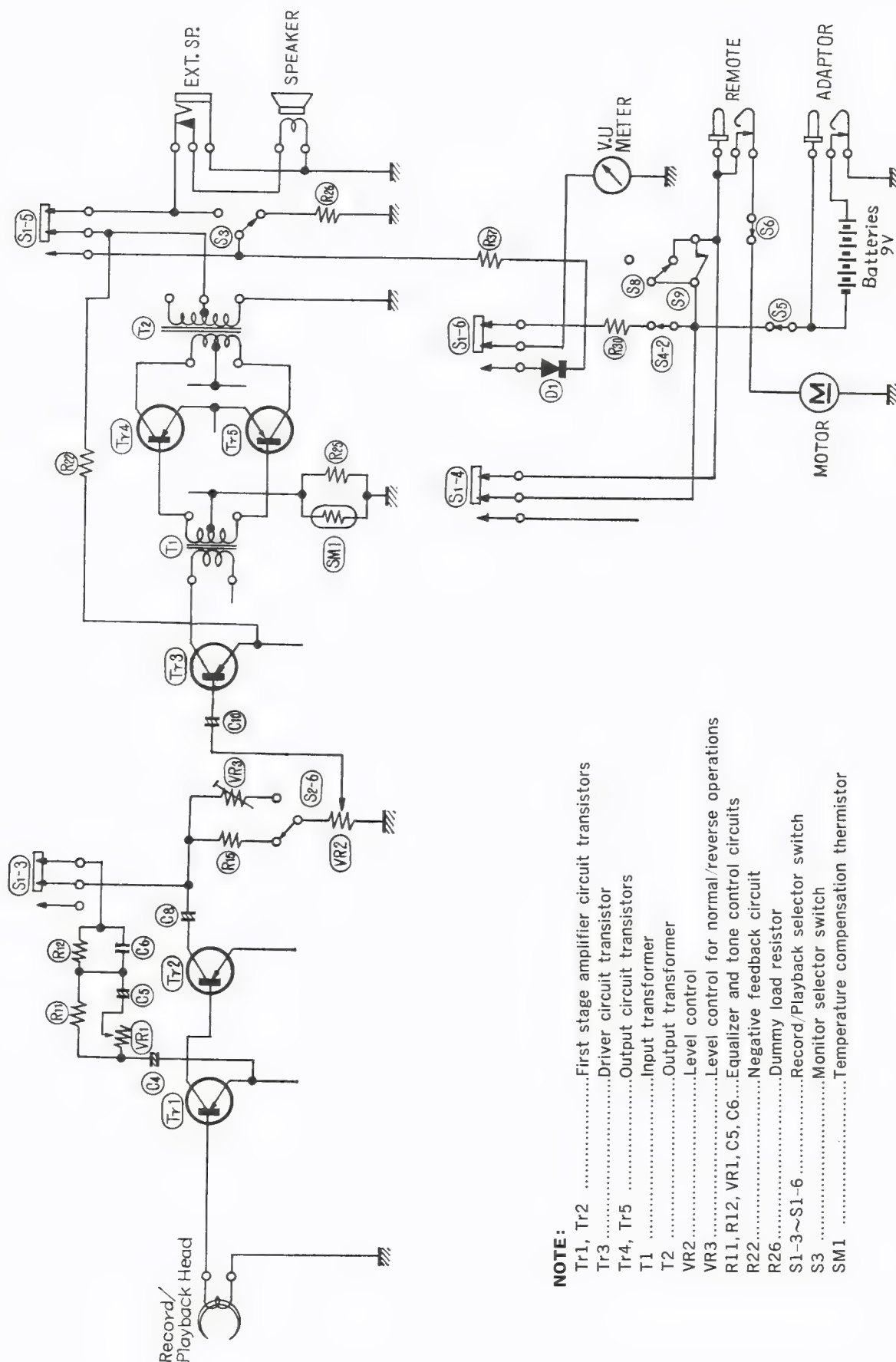


## 1. RECORDING AMPLIFIER CIRCUIT



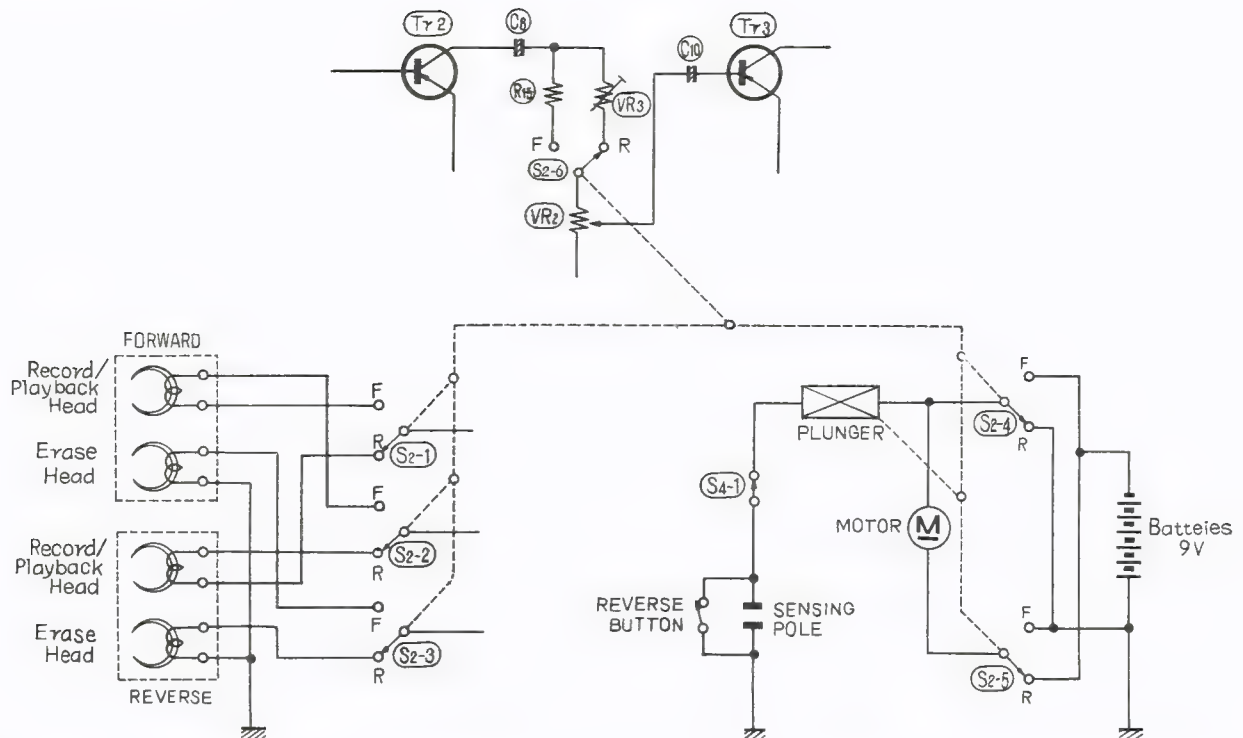
- |           |                                     |
|-----------|-------------------------------------|
| R13, C7   | Equalization circuit                |
| R22       | Negative feedback circuit           |
| R26       | Dummy load resistor                 |
| SI-3~SI-6 | Record/Playback selector switch     |
| S3        | Monitor selector switch             |
| D1        | Rectifier diode                     |
| SM1       | Temperature compensation thermistor |

## 2. PLAYBACK AMPLIFIER CIRCUIT





### 3. REVERSE CIRCUIT

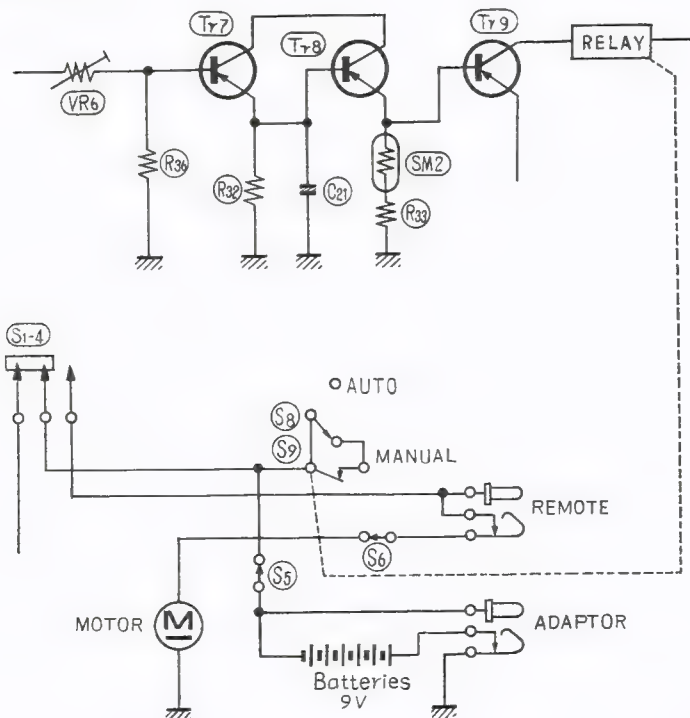


**NOTE:**

- S2-1~S2-6.....Head selector switch (shown in normal reverse position)  
 S4-1 .....Plunger power switch  
 1. S4-1 turns "ON" when the recorder is set for PLAY or RECORD mode only, therefore the "Reverse Button" and the "Sensing Pole" are operative only when the recorder is set for "PLAY" or "RECORD" mode.

2. If the "Reverse Button" is "ON" or the "Sensing Pole" is short circuited by means of a sensing tape attached on the tape, the plunger is activated thus sets the slide switch (S2) to "Reverse" position causing the tape to move in reverse direction.

### 4. VOICE OPERATION CIRCUIT



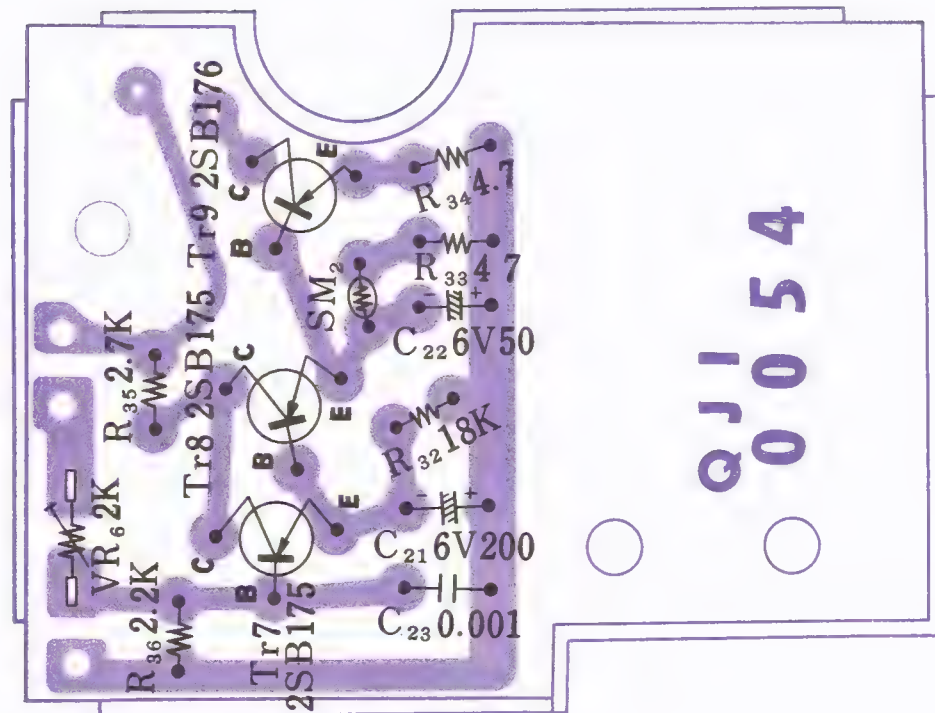
**NOTE:**

- Tr7, Tr8, Tr9 .....3-stage DC amplifier transistors  
 VR6.....Voice operation sensitivity control  
 R32, C21 .....Delay circuit

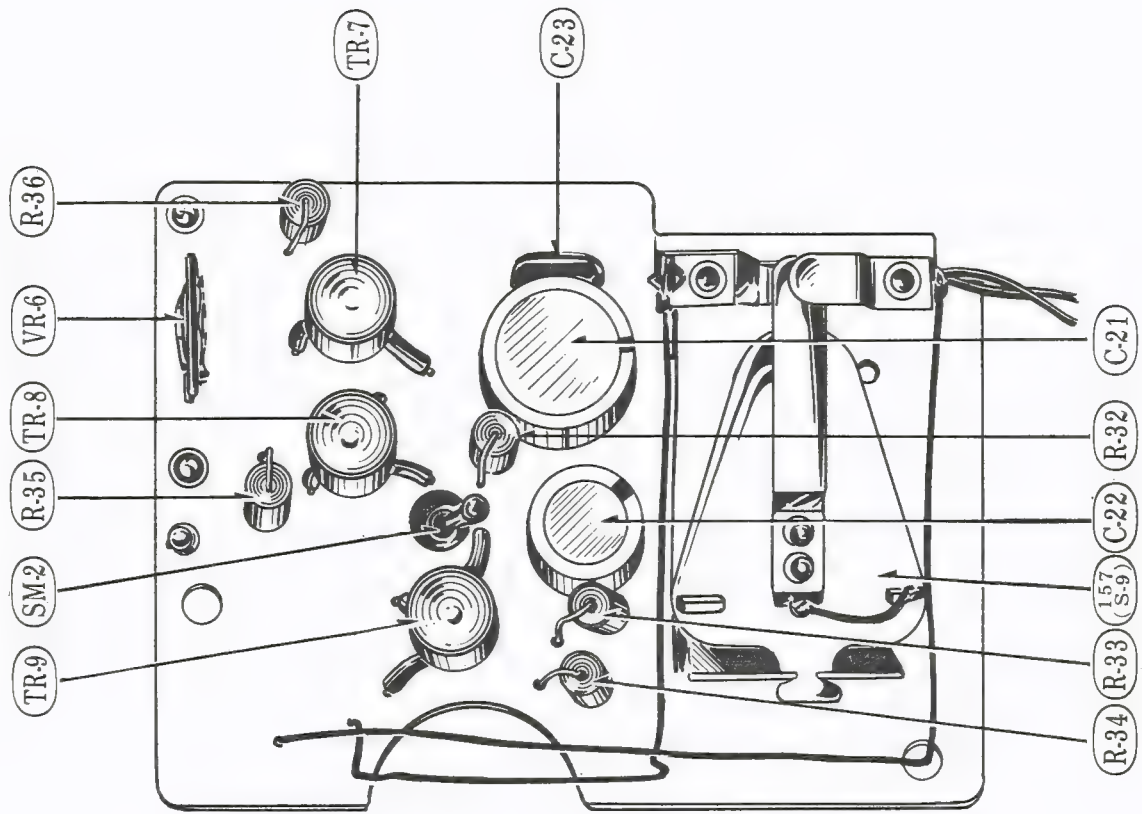
- S8 .....AUTO/MANUAL Selector Switch  
 S9 .....Relay contacts  
 SM2 .....Temperature compensation thermistor

# CIRCUIT BOARD

CONDUCTOR VIEW

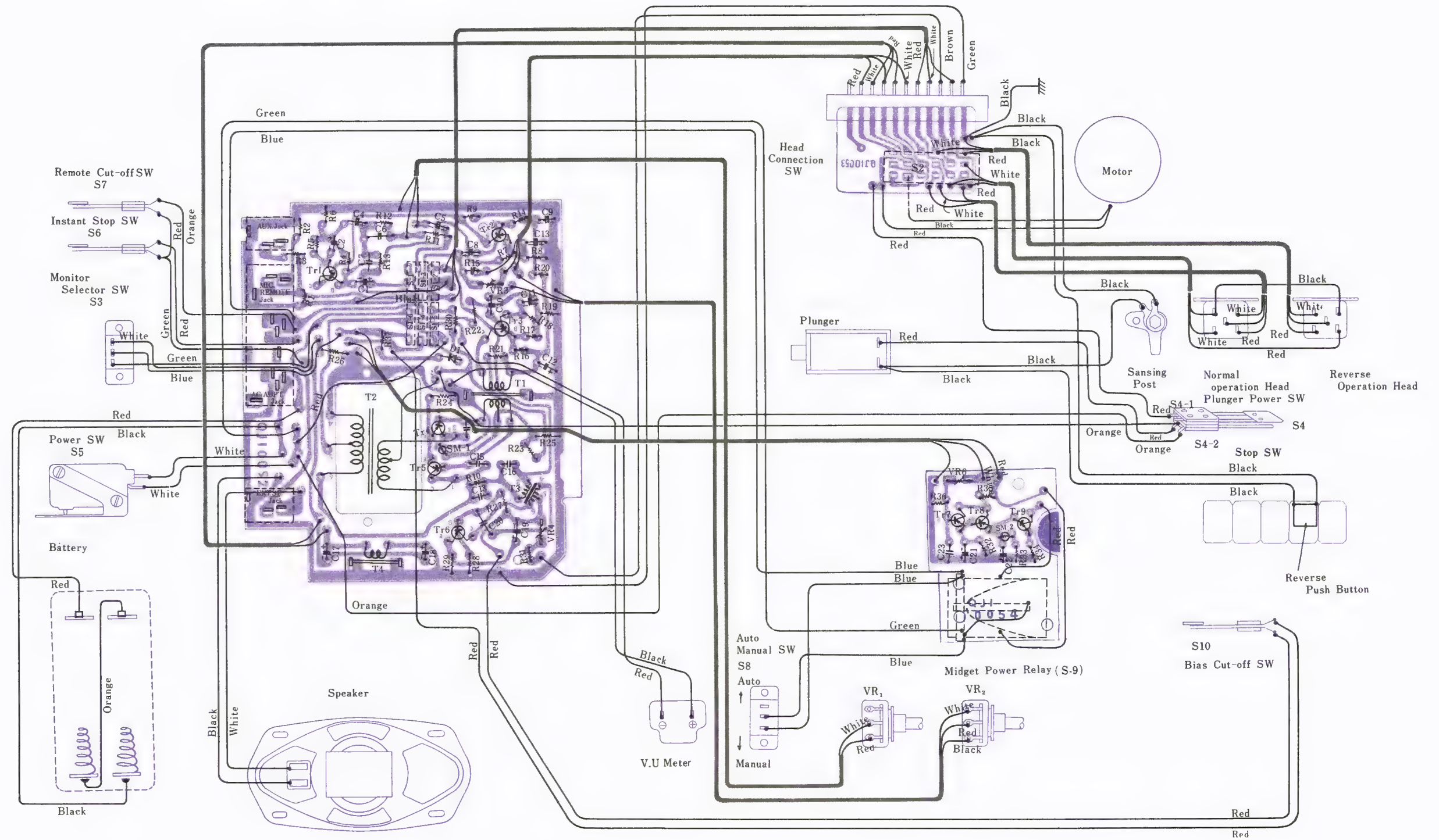


ELECTRICAL PARTS LOCATION





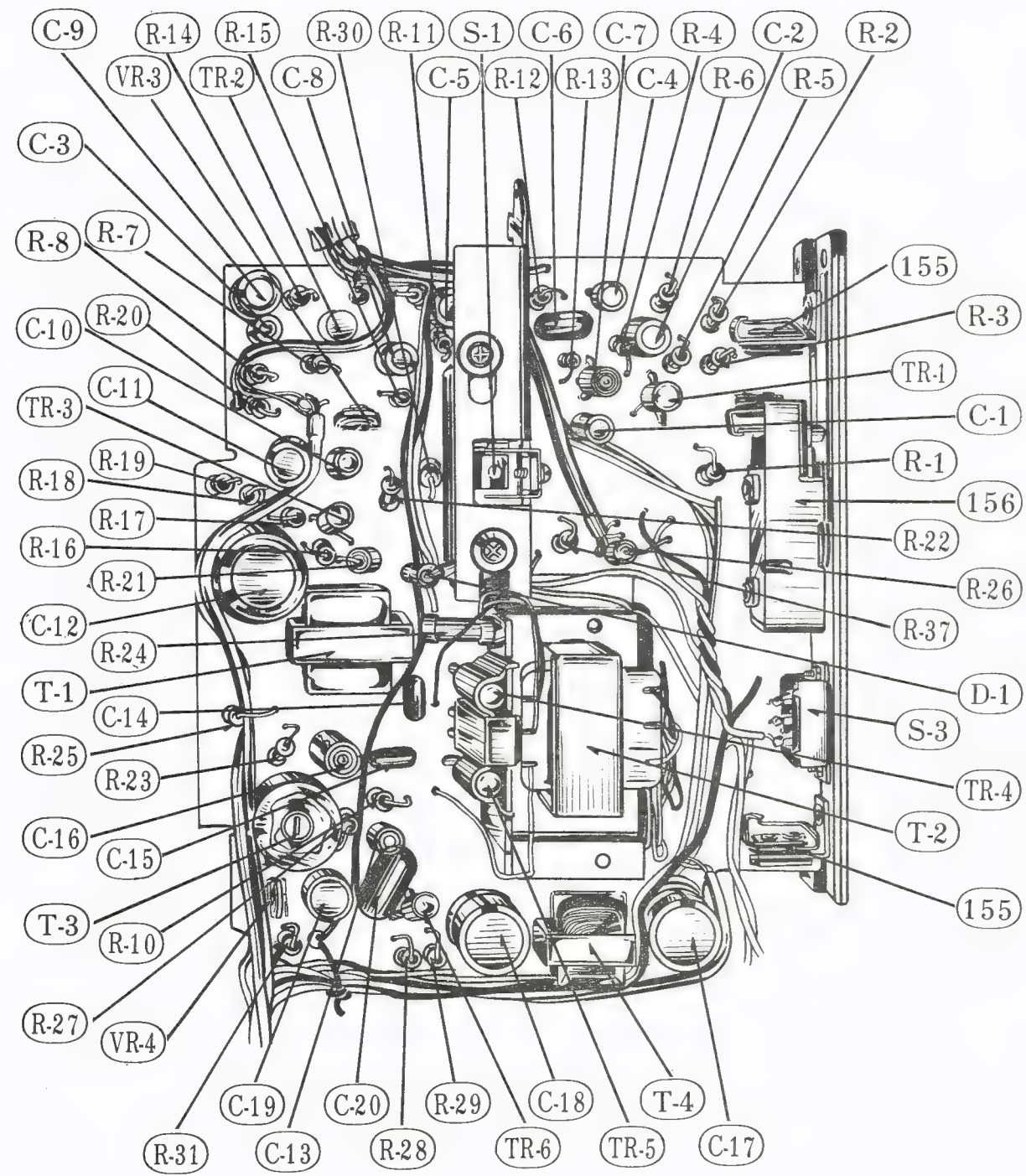
# WIRING CONNECTION DIAGRAM MODEL RQ-158S



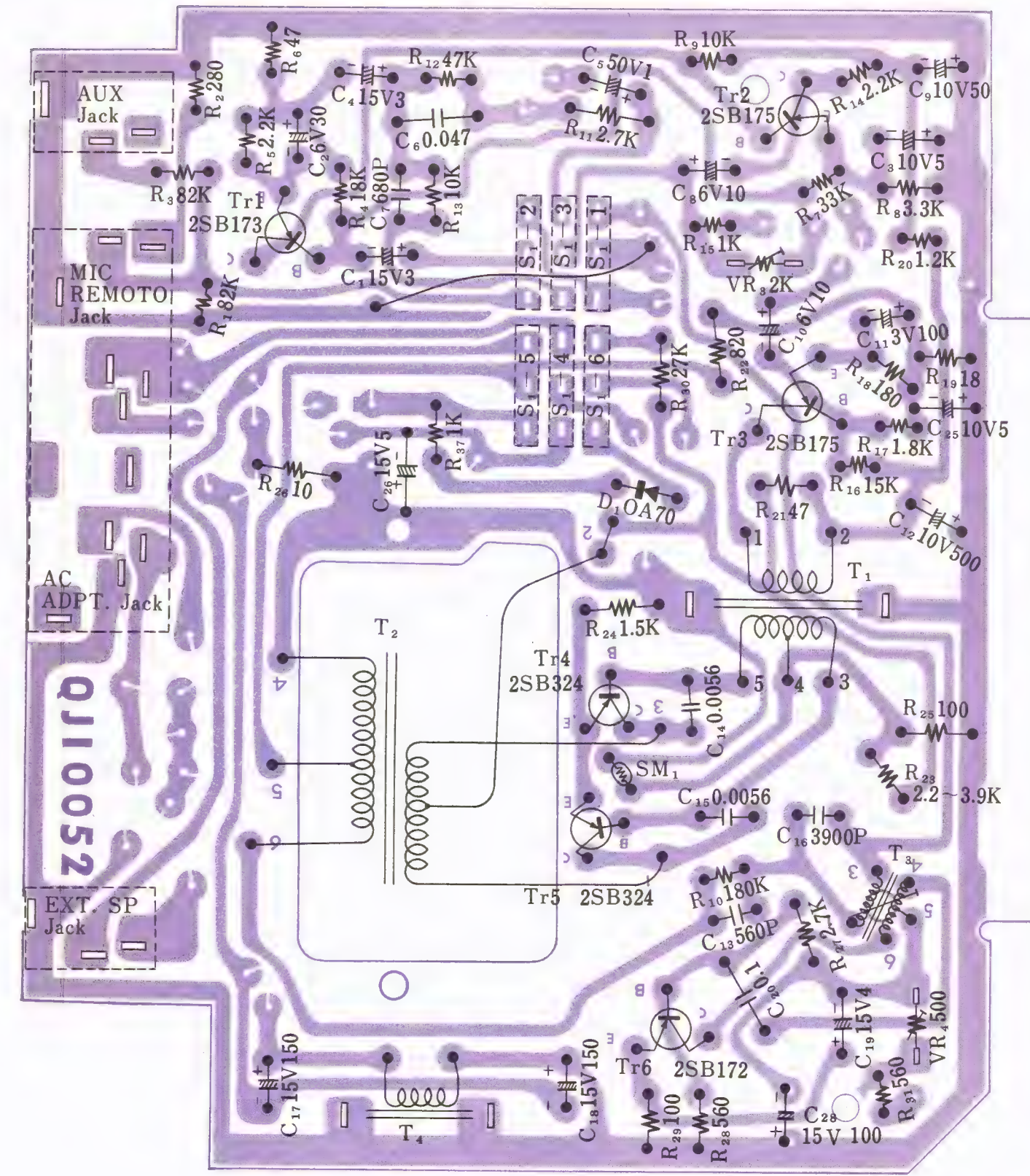


CIRCUIT BOARD

ELECTRICAL PARTS LOCATION

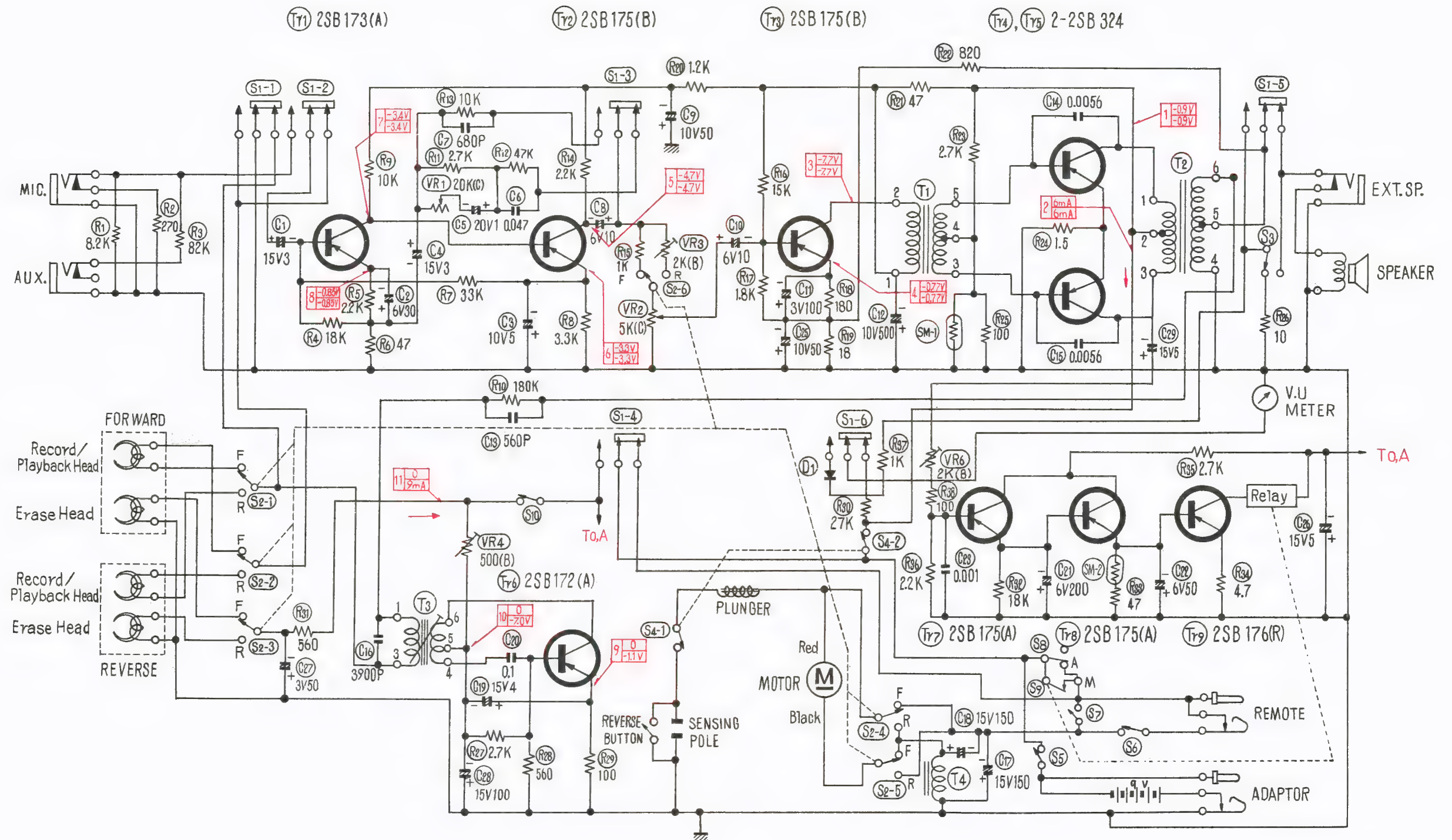


CONDUCTOR VIEW





# SCHEMATIC CIRCUIT DIAGRAM MODEL RQ-158S



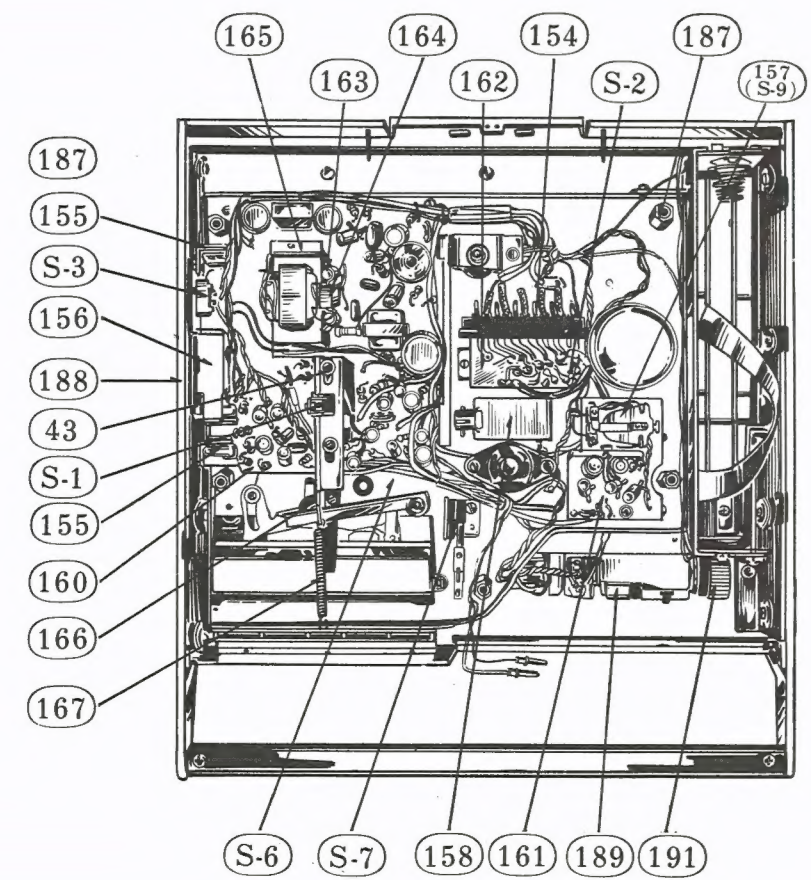
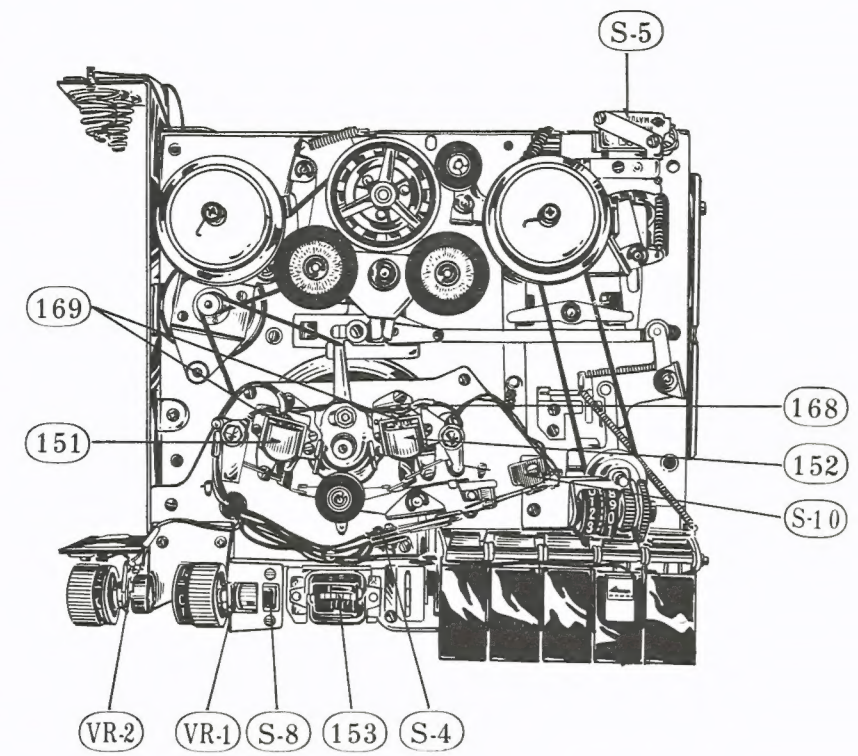
## NOTE:

1. S1 ..... Record/Playback Selector Switch (shown in playback position)
2. S2 ..... Head Selector Switch (shown in normal forward position)
3. S3 ..... Monitor Selector Switch
4. S4-1 ..... Plunger Power Switch
5. S4-2 ..... Stop Switch ("OFF" when in F.F. and Rewind modes)
6. S5 ..... Power Switch
7. S6 ..... Instant Stop Switch
8. S7 ..... Remote Cut-off Switch ("ON" when in F.F. and Rewind modes)

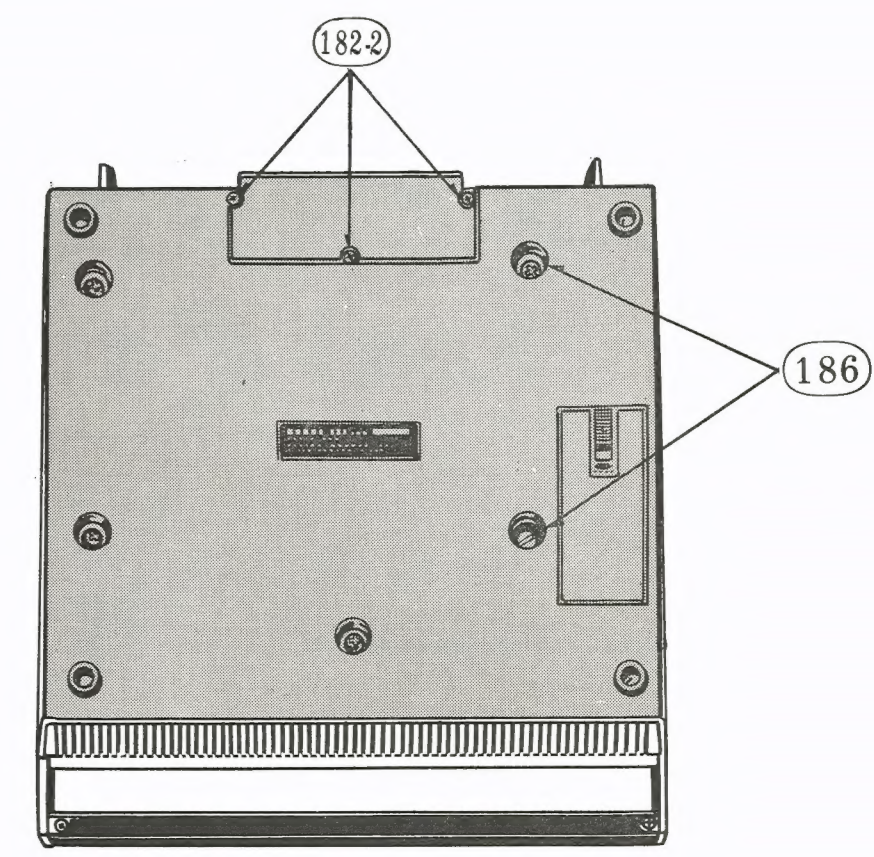
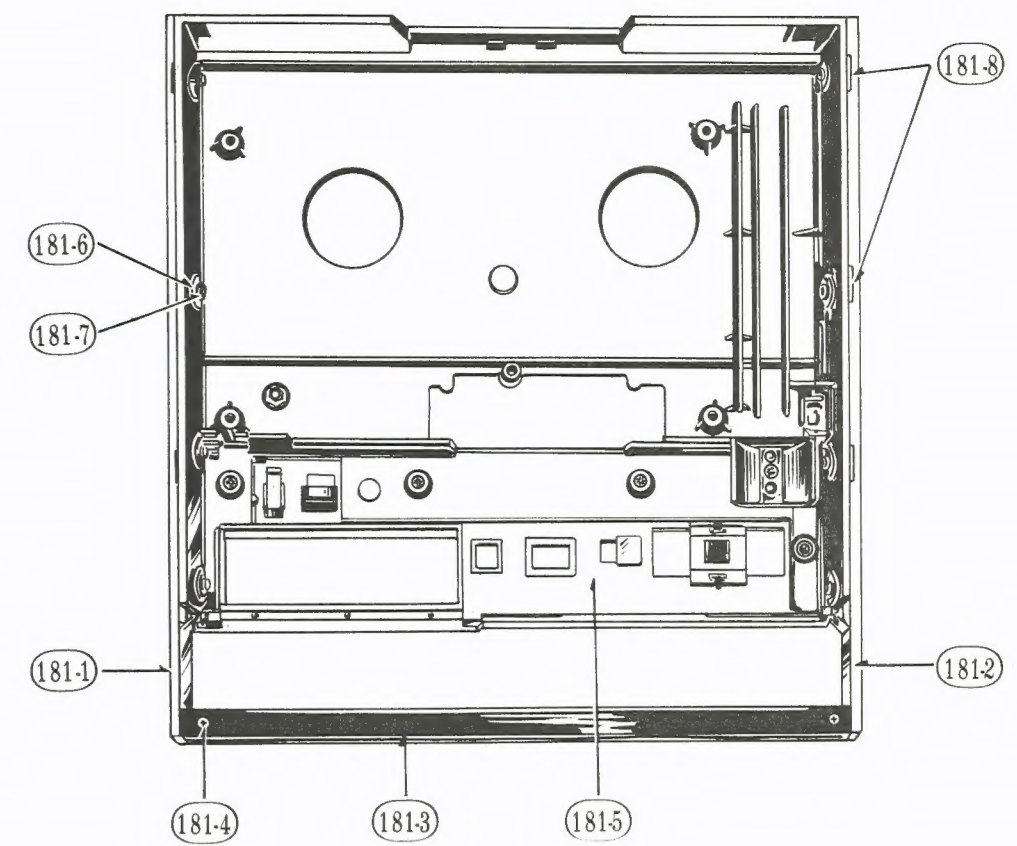
9. S8 ..... Voice Operation (AUTO/MANUAL) Selector Switch
10. S9 ..... Relay contacts
11. S10 ..... Leaf Switch ("ON" when in PLAY and Record modes)
12. All resistance in  $\Omega$ , 1/4W unless otherwise indicated.  
K=1,000  $\Omega$  M=1,000,000  $\Omega$
13. All capacitance in  $\mu$ F, unless otherwise indicated. P= $\mu$ F
14. Values indicated in    are DC to chassis ground with no signal applied.
15. The upper values should be measured during playback and the lower values during recording.



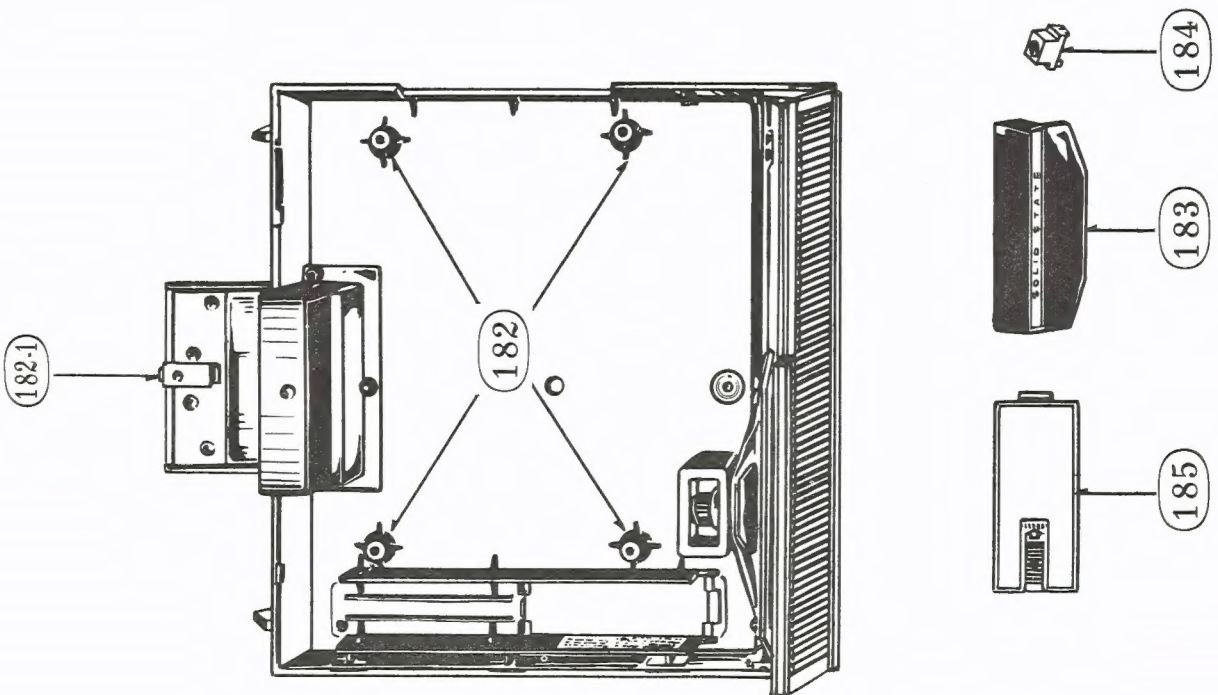
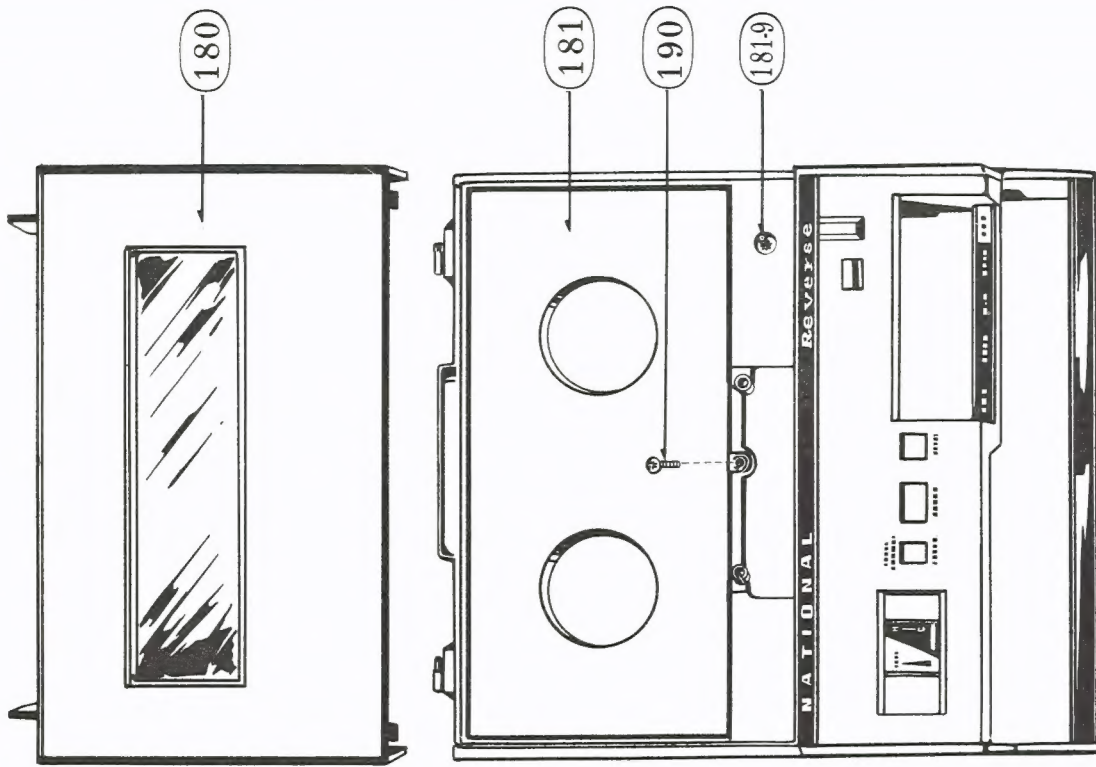
ELECTRIC PARTS LOCATION



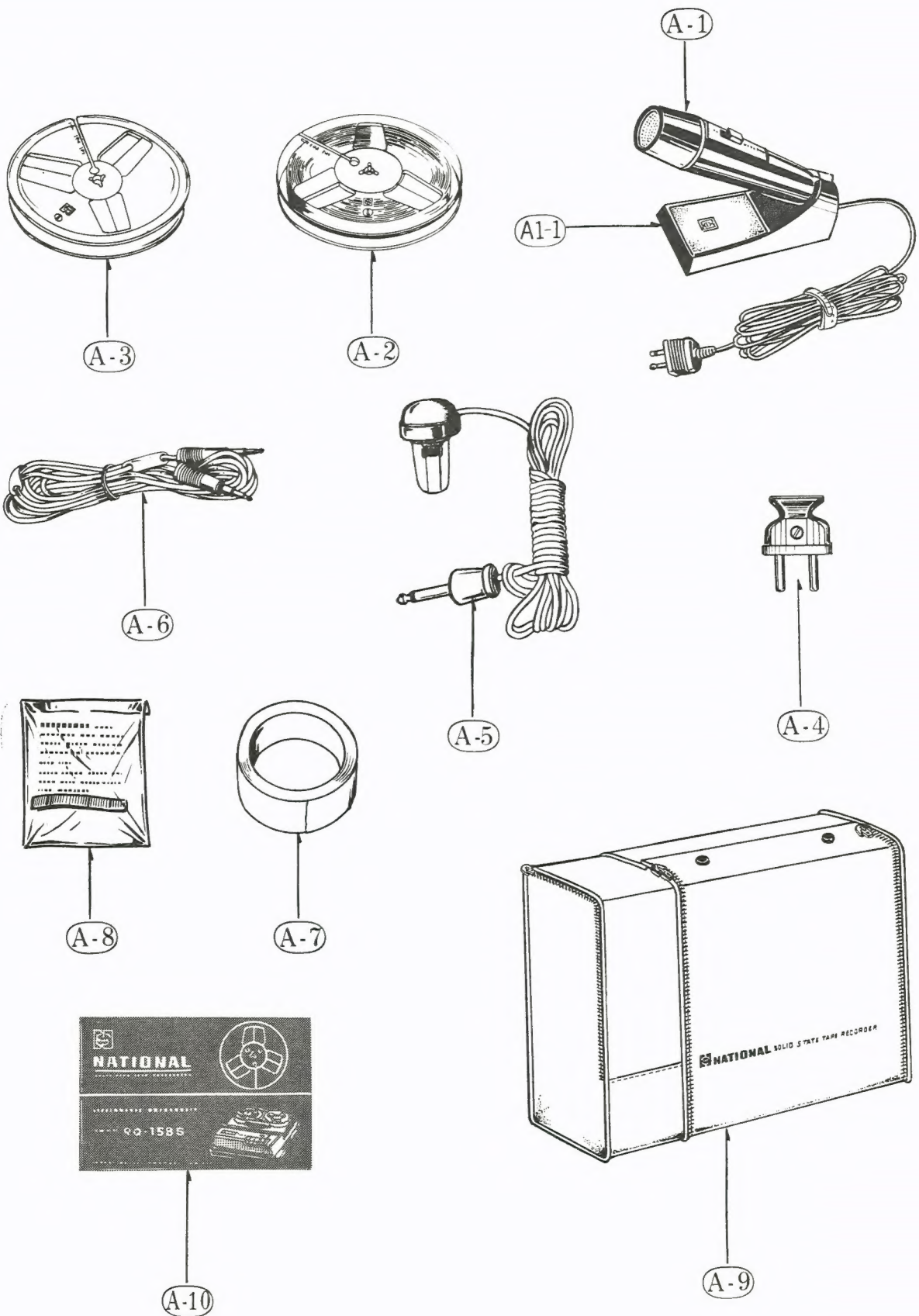
CABINET PARTS







# ACCESSORIES





# COMPONENT PACKING

